RAILROAD GAZETTE

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CONTENTS

ILLUSTRATIONS:	PAGE.
The "Standard" Air Brake for Street Cars	386
Ten-Wheel Locomotives for the Wisconsin Central Lines	387
A Scheme for Heavy Electric Traction in Paris	390
Dickson Locomotives for India and Japan	391
EDITORIALS:	
The Effect of Excessive Clearance	392
The Care of the Public	392
The Security Market	393
EDITORIAL NOTES	392, 393
NEW PUBLICATIONS	393
TRADE CATALOGUES	393
GENERAL NEWS:	
Locomotive Building	397
Car Building	397
Bridge Building	397
GENERAL NEWS:	**PAGE.**
Meetings and Announcements	397
Personal	398
Elections and Appointments	398
Railroad Construction	399
Electric Railroad Construction	399
General Railroad News	400
Electric Railroad News	400
Traffic	400
MISCELLANEOUS:	
Technical	395
The Scrap Heap	396
Papers Before the American Society of Mechanical Engineers	385
Railroad Commissioners' Convention	389
Demurrage vs. Switching Associations	389
National Association of Car Service Managers	390
London Underground Railroads and Electricity	391
Laying New Steel	391
The Holding Power of Nails	395

Papers Before the American Society of Mechanical Engineers.

This week the American Society of Mechanical Engineers meets at Niagara Falls. Below is given in condensed form the substance of nearly all the papers that have thus far been sent to us.

Professor Thurston's paper on "Graphic Diagrams and Glyptic Models" is interesting and important, but could not be sufficiently condensed to make it of real value to the reader without preserving much of the original in order to make the diagrams clearly understood. This would take up more space than we can now give to the paper.

Experiments on Cast Iron Cylinders.—By C. H. Benjamin.

The tests reported in this paper cover several years. The cylinders tested were cast by the Taylor & Boggis Foundry Company, of Cleveland, from a special foundry mixture, and the metal showed a fine gray fracture with a tensile strength of about 24,000 lbs. per square inch and a modulus of rupture of about 35,000 lbs. under a transverse load. The above figures hold for all of the cylinders tested, except the first three, which were of common foundry iron, having a tensile strength of about 18,000 lbs. The lengths of the cylinders were approximately twice the diameters, the latter measuring 6, 9 and 12 in., internally.

The flanges and heads were made of extra thickness, in order that the rupture might always occur in the shell of the cylinder. Each shell was practically uniform in thickness, and the flanges were faced and counter bored. Steel bolts with a tensile strength of about 80,000 lbs. were used to fasten on the heads, and were used in sufficient numbers so as to give an excessive strength and to prevent leakage. In spite of this precaution, however, the author states that of all the difficulties encountered the most serious was that of finding any satisfactory packing for the heads of the cylinders, and the tensile strength of the bolts was much in excess of the strength of the cylinders, and yet under the comparatively low pressure of 400 to 600 lbs. per square inch the bolts stretched enough to practically relieve the reaction of the gasket. The metal gaskets all failed on account of their lack of elasticity, and while tight at lower pressures they failed at higher pressures. This was caused by the bolts stretching and the soft metal failing to respond to the elasticity of the bolts. The rubber gaskets failed on account of weakness. Finally the cylinders were counter bored to a depth of about ⅛ of an inch, and a gasket made of straw-board soaked in boiled linseed oil was used. This was cut to fit the counter bore, thoroughly saturated with oil, and then allowed to stand several hours before being put in position. Another serious difficulty was encountered in the presence of minute blow holes in the shell of the cylinder.

Before beginning each experiment the air was forced out of the cylinder through a small vent at the top. The pressure was then gradually applied until the rupture occurred. The author states his conclusions as follows:

Cast iron cylinders of the form ordinarily used for engines, when subjected to internal pressure, are quite as likely to fail by tearing on a circumference as by splitting.

By reason of local weaknesses and distortions the cylinder may fail when the stress, as calculated by the ordinary formula for thin shells, is only about one-third of the strength shown by a test bar.

The principal cause of weakness is the sponginess of metal due to uneven cooling; that to insure good castings the flanges should not be materially thicker than the shell, the cylinders should be cast on end, and suitable visers provided for the escape of dirt and gas.

Patents.—By James W. See.

This paper is especially interesting to inventors. The paper sums up in a comparatively few words the important points which inventors should consider. The following points were discussed, and may give in a word an idea of some of the important considerations which should always be kept before the mind of an inventor:

A patent is not a license.
Change of purpose is not patentable.
Combination claims are good claims.
Aggregation is not invention.
Specific claims should supplement generic claims.
Sub-combinations are patentable.
Modifications should not generally be set forth in patents.
Divisional applications are wise and often necessary.
A superior patent solicitor is not necessarily the best for all classes of cases.
The contingent fee system is generally but not necessarily bad.
Infringement cannot always be determined from the face of the patent.
The Government cannot insure the validity of a patent.
Foreign patents should be contemplated with caution.

The subject of "combination claims" is given below in full.

Many people have an erroneous notion regarding patent claims, and consider the expression "combination" as an element of weakness. The fact is, that all mechanical claims that are good for anything are combination claims. No claim for an individual mechanical element has come under my notice for many years, and I doubt if a new mechanical element has been lately invented. All claims resolve themselves into combinations, whether so expressed or not. Combination does not necessarily imply separateness of elements. The improved carpet tack is, after all, but a peculiar combination of body and head and barbs. The erroneous public contempt for combination claims is based upon the old legal maxim, that if you break the combination you avoid the claim and escape infringement, and this legal maxim should be well understood in formulating the claims. If the claim calls for five elements and the competitor can omit one of the elements, he escapes infringement. Therefore, the claim is good only when it recites no elements which are not essential. Many inventors labor under the delusion that a claim is strong in proportion to the extent of its array of elements. The exact opposite is the truth, and that claim is the strongest which recites the fewest number of elements. It is the duty of the inventor to analyze his invention and know what is and what is not essential to its realization. It is the duty of the patent solicitor to sift out the essential from the non-essential, and to draft claims covering broad combinations, involving only essential elements. Sometimes the inventor will help him in this matter, but quite as often he will, through ignorance, hinder him and combat him. The invention having been carefully analyzed and reduced to its prime factors, and the claim having been provided to comprise a combination involving no element which is not essential to a realization of the invention, a new and more important question arises. The elements have been recited in terms fitted to the example of the invention thus far developed. The combination is broadly stated, but the terms of the elements are limiting. Cannot some ingenious infringer realize the invention by a similar combination escaping the literalism of the terms of the elements? It is at this stage that the claim must be carefully studied. The inventor, or some one for him, must assume the position of a pirate, and set his wits to work to contrive an organization realizing the invention, but escaping the terms of the proposed claim. When such an escaping device is schemed out, then the defect in the claim is developed, and the claim must be redrawn. In this way every possible escape must be studied so as to secure to the inventor adequate protection for his invention. Solicitors find it difficult to get inventors to do or consider this matter properly, inventors being too often inclined to disparage alternative constructions, the matter being largely one of sentiment founded on the love of offspring. The wise inventor will recognize the fact that the patent which he proposes to get is the deed to valuable property; that the object of the deed is not to permit him to enter upon the property, for he can do that without the deed, but that it is to keep strangers from entering upon the property; that he desires to enjoy his invention without unauthorized competition; that when the property begins to yield profit it will invite competition; that competitors may make machines worse than or as good as or better than his; and that he can get adequate protection only in a claim which would bar poorer as well as better machines embodying his invention. Briefly, then, all good claims for mechanism are combination claims; the fewer the elements recited the stronger will the claim be; non-essential elements weaken or destroy the claim; the claim should not be considered satisfactory so long as a way is seen for the escape of the ingenious pirate.

Carbon Contents of Piston-Rods As Affecting Their Endurance.—By Joseph E. Johnson, Jr.

The subject of the relative endurance under reversed stresses of materials of different tensile strength and hardness has recently been attracting considerable attention from engineers, and the theory, until recently universally held, that for withstanding these repeated or reversed stresses a very soft material was necessary has had to be revised to the extent of complete abandonment, at least in many cases.

About six years ago the company with which the writer is connected bought a Vauclain compound locomotive. This first locomotive ran for three years and two months, when a duplicate was bought and the first put in the shop for a general overhauling. During the overhauling the piston-rods were renewed, having worn down too small to work well with the metallic packing any longer. The material for the new rods was ordinary "machinery steel," taken from stock on hand. The rods on this engine (No. 4) were straight from shoulder to shoulder, while those of the "duplicate" (No. 5) were reduced in the body, having a collar ¼-in. larger than the rod and ½-in. wide next to the shoulder at the crosshead end.

After having been in service about fourteen months one of the low-pressure rods of No. 5 "let go" and smashed the cylinder-head, without, however, doing any very serious damage. Within a few weeks the overhauled engine did the same thing.

This was becoming a serious matter, and after some careful consideration the writer ordered some genuine Swedish iron to make rods of. It was beautiful stock, and so soft that it acted almost like lead in the lathe, being very difficult to get a smooth finish on. A set of these was put into one of the engines at once and ran about four months, when one of them let go in the same way. The rods that broke were all low-pressure ones, due undoubtedly to the fact that in the "emergency," or starting gear, those cylinders get almost full boiler pressure, 180 pounds per square inch. The rods were all broken in the same way, and right in the shoulder the metal cracked at top and bottom and the crack gradually widened, as could be seen by the worn appearance of the upper and lower segments of the break, which gradually approached each other until only a narrow horizontal strip of solid metal was left across the middle of the rod when the final rupture occurred.

In view of the reported action of high carbon steel under reversed stresses, the breaking of the rod of this material was not a very great surprise, and was met by ordering material for a set of rods of high carbon and one of nickel-steel from the Bethlehem Iron Company. These have now been in considerably over a year, and we hope that they will last long enough to wear out without breaking.

The writer had the three rods which had been broken and the one which had worn out analyzed to see how they bore out the theory of high-carbon material versus low. The results are given herewith:

	Sulphur.	Manganese.	Phosphorus.	Silicon.	Carbon.
First rod in No. 4 locomotive; machine steel; ran three years and two months without breaking	.094	.70	.082	.014	.466
Second rod in No. 4 locomotive; machine steel from Longdale stock; ran fifteen months and broke	.056	.64	.125	.021	.152
First rod in No. 5 locomotive; iron; ran fourteen months and broke	.020	.12	.04	.148	.120
Third rod in No. 4 locomotive; Norway iron; ran four months and broke	.006	.05	.055	.021	.044

It will be seen that these results bear out the theory to a striking extent, there being nothing in No. 1 to cause its far greater endurance except the carbon, and possibly to a slight extent the sulphur, which is also claimed by some to be a hardener.

If 30 miles per day under steam, 28 days per month, be taken, the diameters of the drivers being 36 inches, the revolutions per day would be, say, 16,000, and per month, say, 450,000; this would make for the second and third rods about 6,000,000 double flexures before rupture, and for the Swedish iron rod, say, 1,800,000.

A Standard Method of Conducting Engine Tests.—By George H. Barrus.

The present need of a standard method of testing engines is perhaps less urgent than that of testing boilers, pumping engines and locomotives, which have received attention at the hands of the society; but the same general reasons may be advanced in its favor as those which may be found in the reports of the various committees; that is, to bring the methods of testing employed by different experimenters into harmony with each other, and to inaugurate a standard method of reporting the results of engine tests and of expressing engine efficiency.

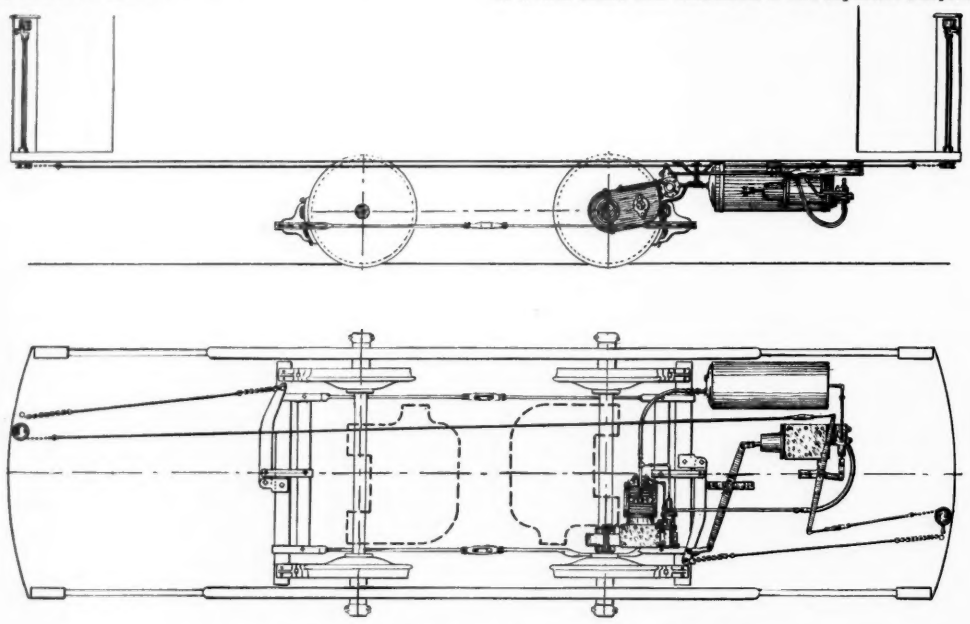
I am inclined to the belief that it would be well now for the society to not only prepare a standard of general engine testing, as suggested, but, at the same time, to revise the work of the two committees on duty trials and locomotive tests, in so far as should be done to bring all three into harmony, and then combine the whole subject of engine testing, whether it be on one type of engine or another, into a single report. There is so much in common among steam engines used for different classes of work that there ought to be little difficulty in devising a standard of testing and reporting efficiency, which would be applicable to all, whether employed in pumping water, hauling trains, operating electric generators, propelling ships, or driving any other kind of mechanism; and, furthermore, there ought to be no difficulty in modifying such a standard so as to make it applicable to the peculiar conditions of service required in any individual case. If a revision of the work of the two committees referred to should be undertaken, I would not advise changes in the substance of their recommendations, for these, so far as I know, are acceptable to the society. What I do suggest is that the whole matter of engine testing be brought into one uniform system, with suitable modifications adapting it to individual requirements, and publish the report or code, whatever it may be called, in one comprehensive document. If this were done, the society would have simply two standard systems of making steam-power tests—one relating to boilers, which, at the date of writing, is about to be submitted in the form revised by the committee of 1895 for the consideration of the society, and the other relating to engines.

The desired uniformity will be secured if the tabular summary of results is expressed in two sections; the first section dealing with such data as apply to the working of the steam in the cylinders, apart from the peculiarities of the service which the engine performs, and the second section giving the data and results pertaining to the special individual work. Following out this scheme more in detail, the first section of the tabular report would contain all the data of measurements of feed water, of steam used by the jackets and re-heaters, if these were employed, the quality of the steam, the weight of steam used by the auxiliary apparatus, and all the data of the various pressures, temperatures and speed relating to the work of the engine, including the pressures and other data obtained from the indicator cards. It would give the horse-powers developed, the weight of steam consumed by the engine and by the auxiliaries in a unit of time per unit of power, the deductions from an analysis of the indicator diagrams, and the total number of heat units consumed in a unit of time per unit of power. It would also present the standard decided upon for the expression of efficiency.

The second section of the tabular report would vary with each class of engine. In this section there might be five subdivisions, one applying to each main class of engines.

The classes which suggest themselves to me are as follows:

(1.) Factory engines, or engines employed in the production of power in general. (2.) Pumping engines. (3.) Locomotives, (a) shop tests, (b) road tests. (4.) Engines employed in generating electricity. (5.) Marine engines.



"Standard" Street Car Brake—Axle Compressor Equipment.

In the first sub-division few additional data need be given beyond those found in the first section. Engines in general are employed in generating power for such a variety of mechanical operations that the simple expression of efficiency, based on the quantity of heat or steam used per gross or net horse-power per unit of time, covers essentially the whole ground. This section might, however, present the data and results of a coal test of the engine, where this was made, in which case it would give the weight of coal burned, and all the various results depending upon it.

The second sub-division would present the special data in regard to the work of the water end of the engine, such as the quantity of water pumped, the number of feet lifted, and all the special data which are given in the report of the duty trial committee in Vol. XII. of the Transactions. In this section would appear the results expressed in terms of "duty," including the standard based on 1,000,000 heat units.

In the third sub-division there would be two parts, one pertaining to shop tests and the other to road tests, and in both of these there would be the special data pertaining to the work of the locomotive, as formulated by the report of the Committee on Locomotive Tests in Vol. XIV. of the Transactions, including the standard of efficiency therein determined, viz., the quantity of so-called "standard coal" used per dynamometer horse-power per hour.

In the fourth sub-division data would be given embracing the quantity and intensity of the current generated, the electrical horse-power developed and the efficiency of the generator. In the case of railway engines this would also include the current delivered to the motors on the line, and expressions of efficiency based on car mileage.

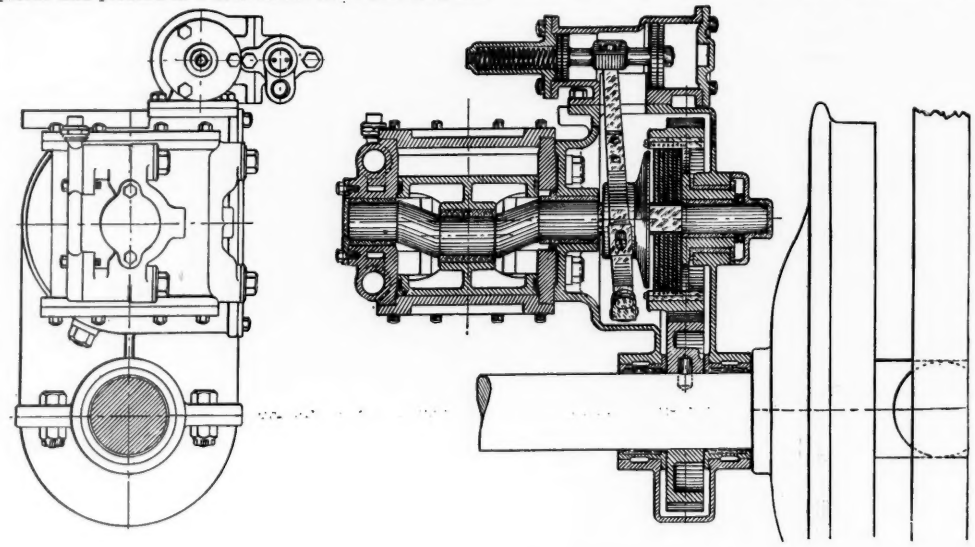
The fifth sub-division would present such data as pertain specially to marine work, such as the quantity of coal consumed and the results bearing upon it, the speed of the vessel, the slip of the screw and the tonnage moved a given distance per unit of power.

The above is an outline giving the main features of one method of formulating the tabular reports so as to secure the objects in view.

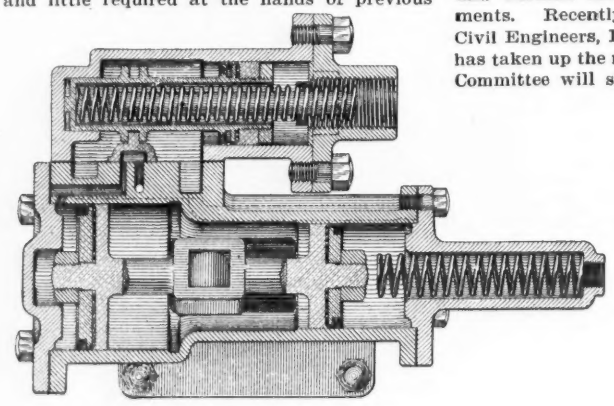
How the indicator should be applied, how it should be operated, how its springs should be calibrated and how the diagrams which it produces should be read and investigated are questions which should be settled by the proposed standard method of engine testing; and to these questions little attention has been given and little required at the hands of previous committees. It may not be out of place to recall the fact that there is no accepted method among engineers of calibrating indicator springs, and it seems to me that in the work suggested investigation and recommendation should be made as to the best mode of dealing with this important subject.

Discussion by Mr. Donkin.

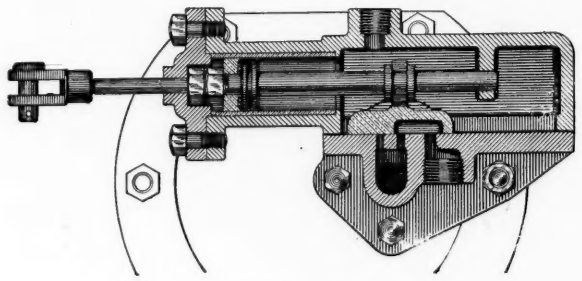
Mr. Bryan Donkin of London discusses the question in a somewhat similar manner to Mr. Barrus, and suggests that a committee be appointed not only to take into consideration the questions of suggesting certain standard methods of testing marine and factory engines, rotary engines, steam boilers, locomotives and pumping engines, but also to standardize a uniform method of testing and reporting on gas and oil engines. Regarding the blank forms, he believes it would cause less confusion if the separate subjects, as suggested by Mr. Barrus, were kept quite separate and distinct. One set he suggests should be drawn up for locomotives, another for marine engines, a third for land fixed engines, a fourth for water pumping engines and a fifth for steam boilers; thus, there might be in all five pamphlets, each embodying complete instructions. Mr. Donkin believes that these pamphlets should be on sale at moderate prices and printed in a convenient form and size, and that these forms should be translated into French and German and adapted to the metric measurements. Recently the counsel of the Institution of Civil Engineers, London, at Mr. Donkin's suggestion, has taken up the matter, and the Thermal Efficiencies Committee will shortly issue a full report.—The paper on "Bending Tests of Locomotive Stay-Bolts," by Mr. Francis J. Cole, is held for a later issue.



"Standard" Street Car Brake—Axle Compressor Equipment.



"Standard" Brake—Governor.



"Standard" Air Brake—Operating Valve.

The "Standard" Air Brake for Street Cars.

The Standard Air Brake Company has produced and put into use on several roads an axle driven air brake designed especially for street cars, and more particularly to meet the requirements of high speed interurban cars. The pumping capacity is such as to maintain maximum pressure, notwithstanding the frequent stops in city service, and the parts are designed to be powerful enough for the exigencies of high speed suburban service. The air pressure is kept up automatically, the compressor starting and stopping according to the predetermined minimum and maximum pressures. It works only when required and at other times is at rest.

A description of the several parts follows, taking up separately the driving mechanism, the pump, the governor, the operating valve and the platform equipment. The parts are shown in the engravings herewith. The apparatus is in use on two or three railroads.

The driving mechanism consists of a split gear fastened to the car axle. This gear is in mesh with another gear, which runs free on the pump shaft, and also forms one member of a friction clutch.

The friction clutch consists of a series of plates, half of which, being the drivers, rotate with the clutch gear, but are free on the shaft, while the other half, placed alternately between the drivers, rotate with the pump shaft, but have a lateral motion on the same, and therefore are the driven. When the pressure is applied the plates are forced together, causing the pump shaft to rotate, but without starting shock. This pressure is applied by the governor by means of a shipper, yoke and collar on the shaft.

The casing is dust proof and contains the driving parts except the pump and governor, which are bolted to it. Within the casing and pump is about one gallon of oil. This oil is forced through all bearings and working parts in the casing and the crank chamber of the pump.

The pump is double-acting, having a piston cast hollow and in one piece, within which are the crank, crank brass and ways. The bearings, subject to the thrust of the piston, are inside beyond the reach of dust. The suction and discharge valves are in the cylinder body and are provided with movable seats to facilitate repairs. The suction and discharge ports are cored to one inlet and one outlet respectively, making only one connection for the suction and one for the discharge. The heads of the pump are not encumbered with any valves or piping. This construction renders the pump easy of access and no pipe connections have to be disturbed in examining or cleaning. Under the suction valves are means for lifting them by exhaust air just before the operating mechanism throws the clutch into engagement, thus relieving the latter at that instant of any load, so the strain on the clutch when thrown in contact is practically nothing.

The governor consists of two cylinders of different diameter, in one casting, fitted with two pistons correspondingly, which constitute the operator, the larger piston and cylinder being twice the area of the smaller. The two pistons are also one casting, and in the center is attached a shipping lever for operating the clutch.

Above, and bolted to the larger cylinder, is the valve chamber of the governor proper, which controls the air to the large cylinder of the operator. Within the valve chamber is a brass slide valve attached to a hollow valve stem, one end of which is a piston against which the air pressure in the chamber acts in overcoming the pressure of the spring within the hollow valve stem.

The air pressure is always in the smaller cylinder, which holds the clutch in contact, and is also at all times in the valve chamber acting on the piston against the spring. When the air pressure reaches a predetermined maximum it overcomes the resistance of the spring and moves the hollow valve stem, which draws with it the slide valve, opening a port which permits the air from the valve chamber to enter the larger cylinder, which, being twice the area of the smaller one, forces the shipping lever in the opposite direction, consequently disengaging the friction clutch, and the pump remains at rest. When the air pressure drops to a predetermined minimum pressure, the air in the valve chamber of the governor has not pressure enough on the piston on the hollow valve stem to resist the force of the spring; it consequently moves back in the opposite direction, drawing the slide valve with it until it opens the port from the larger cylinder to the exhaust. The air pressure which held the clutch out of engagement is released, and, since the air pressure is always on the smaller cylinder, this throws the clutch into engagement again, through the shipping lever, and the pump recharges the reservoir to maximum pressure.

The brake cylinder is the ordinary hollow spindle type, attached to the floating lever. The leverages on the car are not changed and the hand brakes can be used as if no air brakes were on the cars.

The operating valve is bolted to the brake cylinder head, which obviates all piping for this purpose, and the danger from leaky pipe connections is avoided.

The valve is made with a cast iron body; within is a brass slide valve, which is moved by a steel spindle having a piston provided with a cup leather. Since the reservoir pressure is always in this valve chamber it at all times acts on the piston and holds the slide valve in the "off" position. That is, the brake cylinder will always exhaust in the normal position of the operating valve, but when mechanical pressure is applied to the spindle it pushes the slide valve according to the movement of the spindle. There are three ports under the slide valve, a small port for service stops, a large port for emergency application of the brakes, and an exhaust port. The lap of the slide valve is long enough to cover both the service and emergency ports at the same time. The exhaust passes from the emergency port under the hollow slide valve to the exhaust port and is carried by piping to the chamber of the governor spring and also under the suction valves in the pump; and from there it passes by the suction valve "lifts" and out to the atmosphere through the inlet for the suction. The exhaust from the brake cylinder therefore performs two functions. It lifts the suction valves of the pump so that there is no load when the friction clutch makes its contact. It also, in going to the chamber of the governor spring, acts with the latter, and, partially equalizing the air pressure on both sides of the piston, the spring forces the hollow valve stem over and with it the brass slide valve, so that the air in the large cylinder of the governor exhausts, and the clutch is thrown into engagement and the pump restores to the reservoir the air that was used in making the previous stop, the car having run about 40 feet. By the above operation the maximum pressure is maintained for every application. After maximum pressure is reached the governor automatically stops the pump and it remains so until the next exhaust from the brake cylinder reaches the governor.

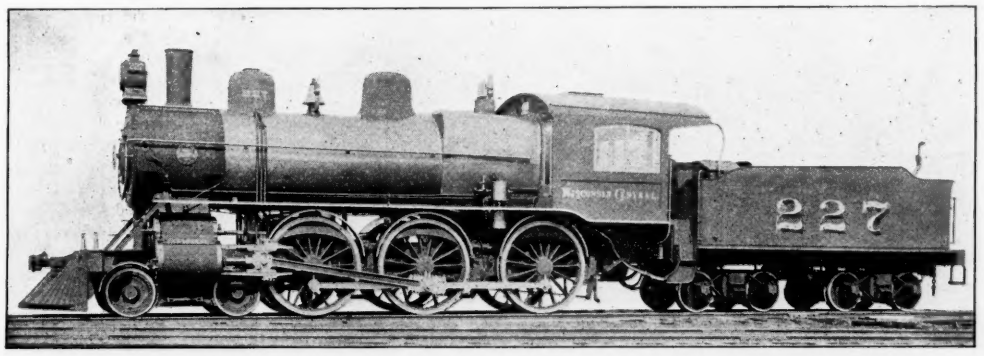


Fig. 1.—Ten-Wheel Passenger Locomotive, Wisconsin Central Lines.

The platform equipment consists of a ¾-in. cold-rolled iron staff within a piece of 1-in. iron pipe, supported by the dash rail, in a convenient place and height for the motorman. On top is a pressure gauge, and immediately under it is the handle by which the motorman manipulates the operating valve. This handle moves altogether through an arc of 180 degrees and the movement is conveyed to the operating valves by means of a rod, chains and bell crank lever under the floor of the car. By a movement of 90 degrees, the service port is opened; 170 degrees, emergency. The instant the handle is released the air pressure on the piston in the operating valve opens the exhaust port. The handle is removed on changing ends and the staff remains locked in the release position. By putting the handle in the emergency position and withdrawing it as far as possible the brake can be left applied.

Special attention is called to the fact that the compressor is in operation only a very small percentage of the car mileage. In Jersey City and Brooklyn, while in the city limits, it is in operation less than one-quarter of the time. A good idea of the time the compressor is in operation in interurban traffic is given on the Consolidated Traction Company's line between Jersey City and Newark, known as the "Plank Road." Between the two cities, a distance of about five miles, very few stops are made, about six, so that in 25,000 feet the compressor is in operation a distance not exceeding 400 feet.

Ten-Wheel Locomotives for the Wisconsin Central Lines.

The Wisconsin Central Lines have now in service ten 10-wheel locomotives designed and built by the Brooks Locomotive works according to the specifications of Mr. James McNaughton, Superintendent of Motive Power and Cars for that road, four engines being for passenger and six for freight service. Both passenger and freight engines are identical in all respects, excepting that 69-in. driving wheels are used for the passenger and 63-in. drivers for the freight engines, also the passenger engines have cylinders 19 in. in diameter, while the freight engines have 20-in. cylinders; the stroke in each case is 26 in. The different size driving wheels cause a variation of 3 in. in the height of the boilers above the rails. But one pattern is required for the cylinder and saddle castings of both classes of engines, as the cylinders are simply bored to the diameter required. It can therefore be said that both classes of engines have interchangeable parts.

The passenger locomotives weigh 150,000 lbs. in working order, and have 116,000 lbs. on the driving wheels, while the corresponding weights of the freight engines are 1,000 lbs. less in each instance; the maximum weight of each tender loaded is 94,000 lbs. The spacing of the wheels is common to both classes, and the total engine wheel base is 24 ft. 9 in., the driving wheel base 14 ft. 6 in., the total wheel base for both engine and tender is 52 ft. 2 in., and the length over all 62 ft. 6 in.

All boilers are of the Belpaire type, with a conical connection to the wagon top. The outside diameter of the barrel at the front end is 66 in., and the working steam pressure is 200 lbs. per sq. in. The boiler checks are placed on top of the boiler within the cab, and the feed pipe is run inside the shell to a point near the center of the boiler. All the fire-boxes have the same dimensions, being 9 ft. 5 in. long, 3 ft. 5⅝ in. wide, 6 ft. 6 in. deep at the front and 5 ft. deep at the rear, are wholly above the frames, and have fire brick arches on water tubes. Each boiler has 308 charcoal iron tubes, 2 in. outside diameter by 13 ft. 2¼ in. long. The firebox heating surface, including that of the arch pipes, is 189 sq. ft., and the heating surface of the tubes is 2,111 sq. ft., thus making a total heating surface of 2,300 sq. ft.; the grate has an area of 32.4 sq. ft. The tenders all have a capacity for 4,500 gallons of water and 8 tons of coal.

Figs. 1 and 2 show the elevation of one of the passenger locomotives, while Fig. 3 gives the principal sections. From these engravings it will be seen that some of the details of construction are peculiar.

The frame is 4 in. thick throughout, excepting that for 44½ in. from the rear end the thickness is reduced to 1½ in., and the depth is correspondingly increased; also the thickness of the front rail is made 3 in., and the depth is likewise increased. The side frames are connected at the rear by two 10-in. channels, and in front by a 13-in. channel. There is no deck plate; the floor of the cab is 17½ in. above the frames, on a level with the tender floor, and a steel casting is used in the rear for attaching the draft rigging.

The arrangement of the spring rigging is clearly shown by Fig. 2. It will be seen that the front driving wheels are cross-connected, one with the other, by a heavy leaf spring, and that the intermediate and rear driving wheels on either side are equalized. The equalizer bars are 1⅜ in. wide, and are arranged in pairs, one bar of each pair being inside and one without the frame. The front and rear ends of the system are pin-connected to elliptic springs fixed to the

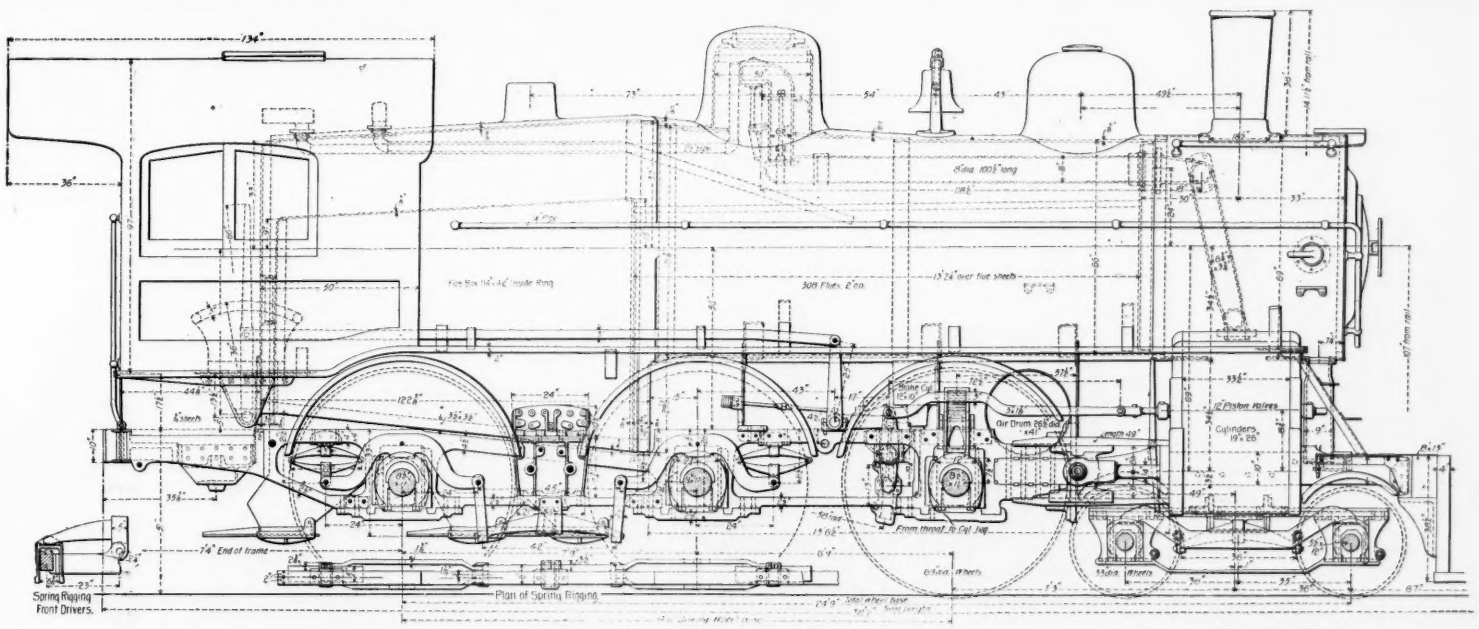


Fig. 2.—Elevation—Wisconsin Central Passenger Locomotive.

J. MCNAUGHTON, *Superintendent of Motive Power.* *Built by the* BROOKS LOCOMOTIVE WORKS.

upper bar of the frame, while the opposite ends of these levers are connected to links, which engage the ends of a heavy spring suspended from the lower bar of the frame. This arrangement of spring rigging should result in an easy-riding engine.

The brake cylinder is placed beneath the barrel of the boiler, and the front engine truck is fitted with brakes on all wheels.

Fig. 4 gives the details of the 12-in. piston valves used with both the passenger and freight engines, and Fig. 5 shows sections through the cylinder and saddle casting. The valve seats consist of two bushings 9 in. long, one near either end of the cylinder, which arrangement reduces considerably the length of the steam passages. Live steam enters through the hollow cavity of the valve, and the exhaust passes out at the ends, which is the reverse of the action of the ordinary D valve. The proportions of the valve are determined by the dimensions of the packing rings, and in Fig. 4 is shown the details of the valve packing for both the passenger and freight engines, which differ in the method of securing the rings. Both valves have a travel of 7 in., and a steam lap, which in the present case is inside, of 1⅛ in. and an exhaust lap or clearance, outside, of ⅛ in. The valves of the passenger engines are given $\frac{1}{8}$ in. negative lead in full gear, and those of the freight engines are set line and line. The valve rods on these engines are for the greater part of rectangular section, are bent so as to clear the front equalizer springs, and form pin-connected points with the round sections near the steam chests. The object of using this form of rod is to get greater stiffness than is given by the usual construction.

Fig. 6 shows the Snowden Bell front end with the Brooks improved spark arrester. The Bell front end arrangement as applied to the Baltimore & Ohio engines was illustrated in the Railroad Gazette, September 10, 1897, and the application to the new twelve-wheel locomotives of the Great Northern Railway was shown March 11 last. The present arrangement, while following the general lines of these former designs, differs in certain details to meet the new conditions, and these changes are clearly shown by the engraving. This front-end is used only on the four passenger engines, and Mr. McNaughton says that "they are excellent steamers."

Cast steel is used for back cylinder heads, driving boxes, driving box saddles, driving wheel centers, pistons and followers, foot plates and furnace bearers while the smoke box front, smoke box door and cylinder head and steam chest casings are pressed steel.

The following is a list of the principal dimensions for both the passenger and freight locomotives, together with the names of the manufacturers of the special equipment:

Description.

Type	Pass. 10-wheel; frt. 10-wheel
Number built	Pass. 4; frt. 6
Name of builder	Brooks Locomotive Works
Name of operating road	Wisconsin Central Lines
Gage	4 ft. 8½ in.
Kind of fuel to be used	Bituminous coal
Weight on drivers	Pass. 116,000 lbs.; frt. 115,000 lbs.
" truck wheels	" 34,000 " " 34,000 "
" total	" 150,000 " " 149,000 "
" tender loaded	94,000 "

General Dimensions.

Wheel base, total, of engine	24 ft. 9 in.
" " driving	14 ft. 6 in.
" " total (engine and tender)	52 ft. 2 in.
Length over all, engine	38 ft. 2 in.
" " " total, engine and tender	62 ft. 6 in.
Height, center of boiler above rails—	Pass. 8 ft. 11 in.; frt. 8 ft. 8 in.
Height of stack, above rails—	Pass. 14 ft. 11½ in.; frt. 14 ft. 8½ in.
Heating surface, firebox	189 sq. ft.
" " tubes	2,111 sq. ft.
" " total	2,300 sq. ft.
Grate area	32.4 sq. ft.

Wheels and Journals.

Drivers, diameter	Pass. 69, frt. 63 in.
Drivers, material of centers	Cast steel.
Truck wheels, diameter	33 in.
Journals, driving axle, size, front and back	8½x11 in.
" " " " main	9x11 in.
" truck " "	5½x12 in.
Main crank pin, size	6¼x6 in.

Cylinders.

Cylinders, diameter	Pass. 19 in., frt. 20 in.
Piston, stroke	26 in.
Piston rod, diameter	4 in.
Kind of piston rod packing	Metallic.
Main rod, length center to center	9 ft. 11 in.
Steam ports, length	18 in.
" " width	2 in.
" " area	36 sq. in.
Exhaust ports, length	56 in.
" " least area	66.5 sq. in.
Bridge, width	2½ in.

Valves.

Valves, kind of	Piston with internal admission.
" greatest travel	7 in.
" steam lap (inside)	1⅛ in.
" exhaust lap or clearance (outside)	⅛ in.
" lead in full gear—	Pass. $\frac{1}{8}$ in. negative, frt. 0 in.

Boiler.

Boiler, type of	Belpaire.
" working steam pressure	200 lbs.
" material in barrel	Steel.
" thickness of material in barrel	⅝ in.
" " " " " tube sheet	¾ in.
" diameter of barrel, outside	66 in.
Seams, kind of horizontal	Quintuple riveted.
" " circumferential	Double riveted.
Thickness of crown sheet	⅜ in.
Crown sheet stayed with	Radial stays.
Dome, diameter	30 in.

Firebox.

Firebox, length	9 ft. 5 in.
" width	3 ft. 5⅝ in.
" depth front	78 in.
" depth back	60 in.
Firebox, material	Steel.
" thickness of sheets	$\frac{5}{16}$, ⅜ and ⅝ in.
" brick arch?	Yes. On water tubes.
" water space, width—	Front, 4 in.; sides, 5 in.; back, 4½ in.
Grate, kind of	Rocking.

Exhaust nozzle, diameter	4⅞, 5 and 5⅛ in.
" " distance of tip above center of boiler	1 in.
Netting	No. 12 wire.
" size of mesh	2½x2½ in.
Stack	Taper.

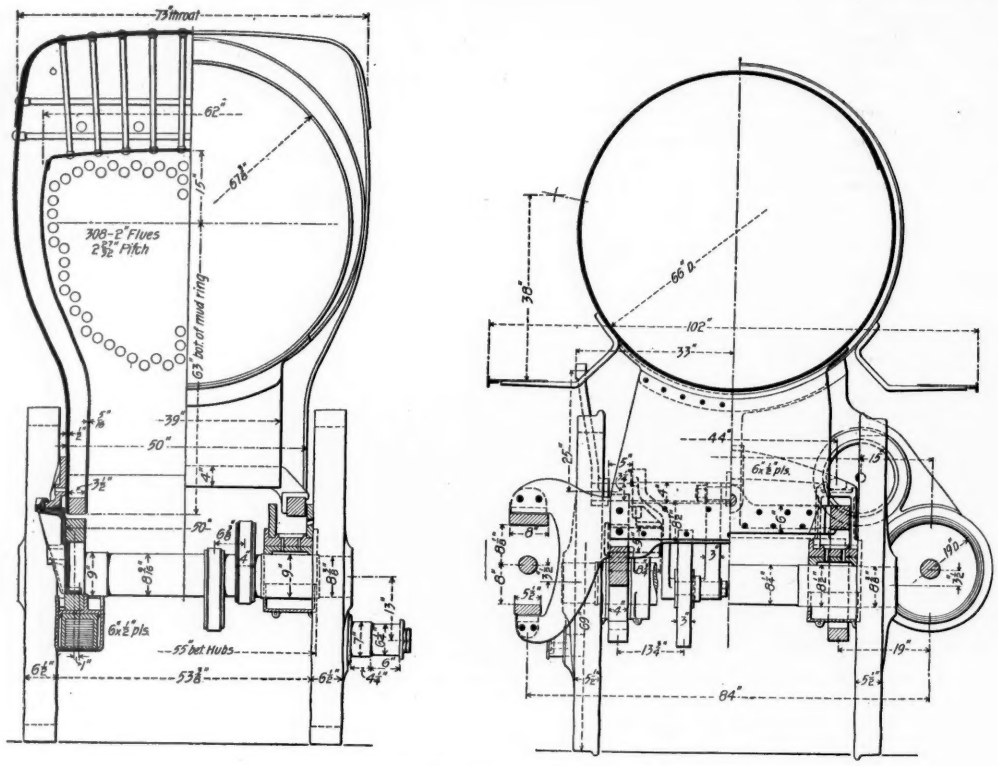


Fig. 3.—Cross Sections.

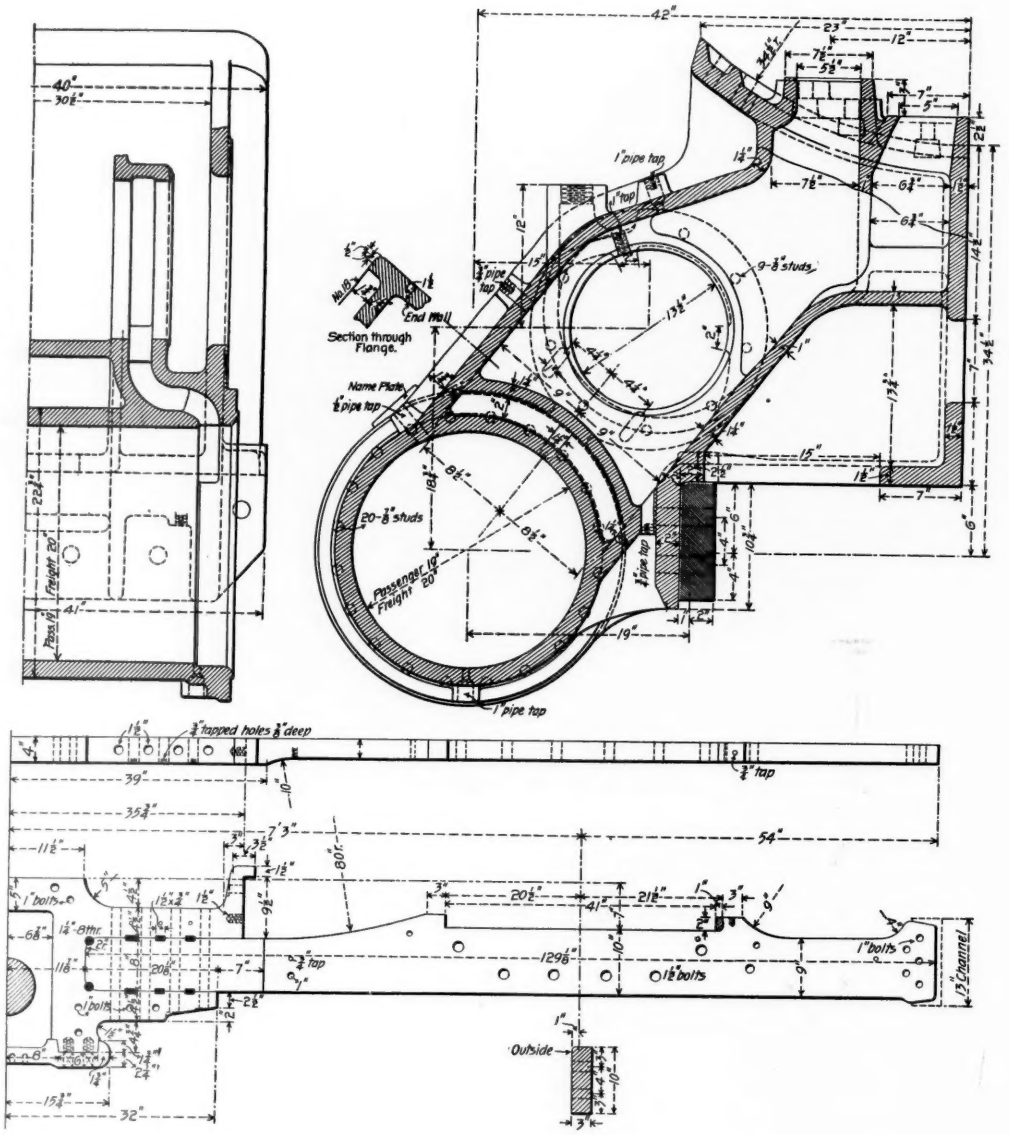


Fig. 5.—Cylinder and Saddle Casting and Connections.

Tubes.

Tubes, number	308
" material	Charcoal iron.
" outside diameter	2 in.
" length over sheets	13 ft. 2¼ in.

Smokebox.

Smokebox, diameter, outside	69 in.
" length	63 in.

Other Parts.

Exhaust nozzle	Single.
" "	Permanent.
Stack, least diameter	15⅞ in.
" greatest diameter	18⅛ in.
" height above smokebox	3 ft. 2 in.

Tender.

Type	With Swivel trucks.
Tank capacity for water	4,500 gallons.
Coal capacity	8 tons.
Kind of material in tank	Steel.
Thickness of tank sheets	$\frac{1}{16}$ and ¼ in.
Type of under-frame	Steel Channels.
Type of truck	Diamond frame.
Type of truck spring	Semi-elliptical.

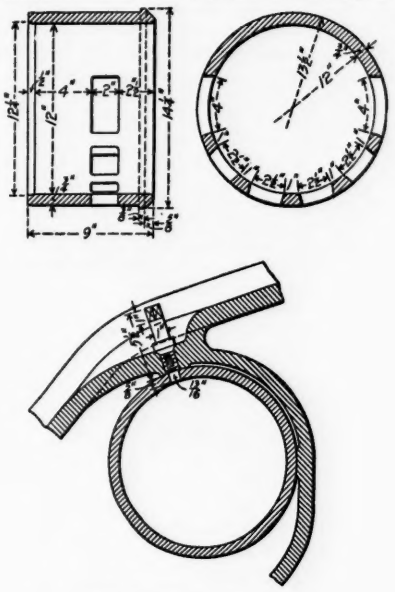
Diameter of truck wheels	33 in.
Diameter and length of axle journals	4¼x8 in.
Distance between centers of journals	6 ft. 3 in.
Diameter of wheel fit on axle	5⅝ in.
Diameter of center of axle	4¾ in.
Length of tender frame over bumpers	22 ft. 4 in.
Length of tank	19 ft. 6 in.
Width of tank	9 ft. 10 in.
Height of tank, not including collar	3 ft. 10 in.
Type of back drawhead	M. C. B. standard.

Names of Makers of Special Equipment.

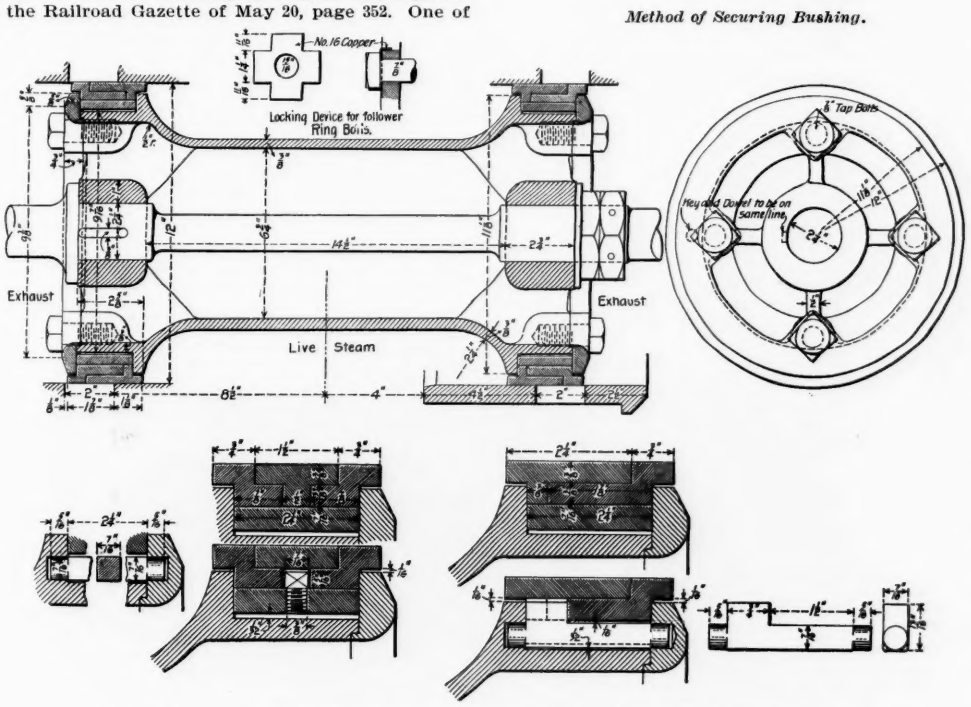
Driving wheel centers	American Steel Casting Co.
Tires	Krupp-Thomas Prosser & Son.
Engine truck wheels	Krupp-Thomas Prosser & Son.
Tender truck wheels	New York Car Wheel Works.
Driving axles, Lowmoor iron	Houghton & Richards.
Sight-feed lubricators	Michigan Lub. Co., Nathan Mfg. Co.
Bell ringer	Golmar.
Front couplers	Latrobe Steel Co.
Back couplers	Gould Coupler Co., Latrobe Steel Co.
Safety valve	Crosby Steam Gage & Valve Co.
Sanding devices	H. L. Leach
Injector	Hancock Inspirator Co., Nathan Mfg. Co., Hayden & Derby Mfg. Co.
Driver brake equipment	Westinghouse-American.
Tender brake equipment	Westinghouse.
Tender brake beam	American Brake Beam Co.
Driver brake shoe	Ross-Meehan.
Air pump	Westinghouse, 9½ in.
Air pump governor	Westinghouse.
Engine truck, driving and tender springs	A. French Spring Co.
Piston rod packings	C. C. Jerome.
Valve rod packings	C. C. Jerome.
Blow-off cocks	C. C. Jerome.

Railroad Commissioners' Convention.

The opening of the annual meeting of Railroad Commissioners at Washington May 10 was reported in the Railroad Gazette of May 20, page 352. One of the features of the first session not given in that report was an address by Mr. E. E. Clark, Chief of of the Order of Railway Conductors, Mr. Clark made a sensible, conservative address. He spoke of the feeling of the people of the country to-day in regard to the heroism of the men fighting for the nation and of the sacrifice of life that is dreaded by every one, and suggested that this general sentiment, at least in times of peace, be turned into the channel of sympathy with the railroad employees of the country, of whom 1,800 sacrifice their lives annually. The insurance departments of the railroad brotherhoods have paid to beneficiaries nearly twenty million dollars. Some of this should be saved when safety appliances have been universally adopted. On the subject of employer and employee Mr. Clark expressed judicious sentiments. The brotherhoods he says, are such an overwhelming majority of the men employed in their kind of work that they may rightfully claim to speak for the whole. He asserted that none of the brotherhoods has ever gone to extremes in support of any cause which they would not willingly have submitted to fairly chosen arbitrators. The federation of brotherhoods is not designed to make might right, but has been formed for the purpose of encouraging peace by concentrating the judgment, wisdom, patience and moral influence of the best men of the different organizations.



Method of Securing Bushing.



Passenger Engines. *Freight Engines.*

Valve Packing Rings.

Fig. 4.—Details of 12-in. Piston Valves.

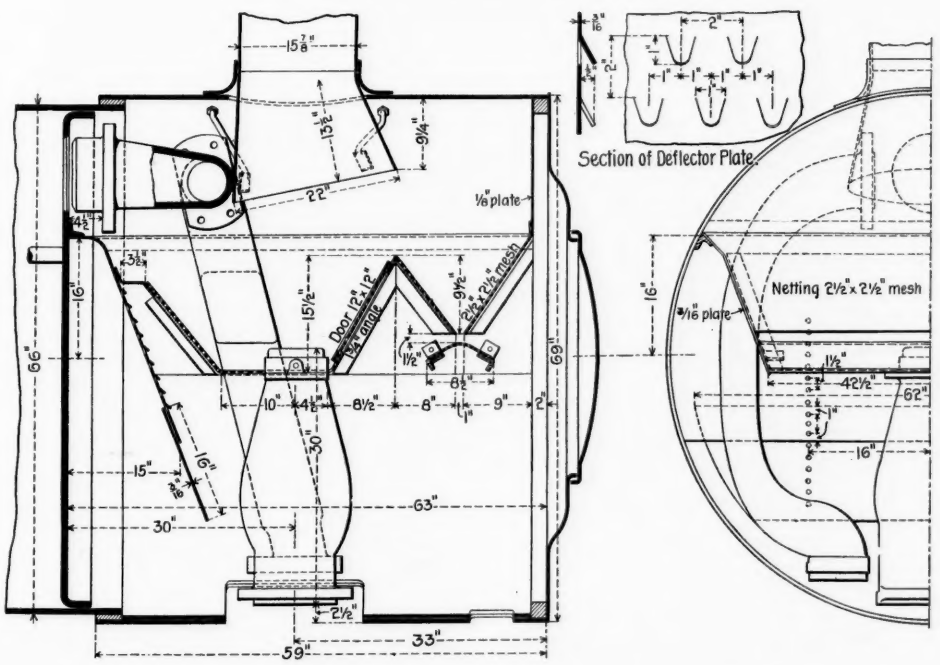


Fig. 6 -- Bell Front End and Spark Arrester with Brooks Improvement.

NOTE.—*This engraving shows the front end and spark arrester as used on the Wisconsin Central passenger engines, except that the Brooks blue print shows the front netting with a mesh 2¼ in. x 1¼ in. and the door 12 in. x 18 in. instead of 12 in. x 12 in.*

Representatives from various states made brief reports of the conditions in their respective states. In Kansas the Supreme Court has just decided that Commissioners' orders are merely advisory and can be enforced only by the courts. The Commissioners have, however, recently issued an order making a rate on live stock, and it was sustained by the Court of Appeals, but the railroads have carried up the case to the Supreme Court. In Minnesota the Commissioners have a suit in the courts to compel express companies to make such reports as the Commissioners want.

A resolution was adopted directing the Committee on Railroad Statistics to prepare a plan and forms for uniform compilation of railroad statistics in all the states. Mr. Brown, of Pennsylvania, offered a resolution looking to the enactment of uniform legislation throughout the country for the gradual abolition of highway grade crossings, but no action was taken on the subject.

The Committee on Legislation having no report to offer, Mr. E. A. Moseley, one of the members, made an individual address. Mr. Moseley holds the radical views of the late Chairman of the Interstate Commerce Commission, Mr. Morrison, and, indeed, in many respects is more vigorous in his expressions than Mr. Morrison himself. A considerable part of his address was devoted to a description of the evils that are likely to befall the people if Congress continues to permit the public to remain entirely at the mercy of the carriers. He recommended legislation in the line of the Cullom bill, No. 3,354, now before Congress, and made detailed recommendations concerning requirements which should be imposed upon the railroads in the way of keeping full records by which the Interstate Commerce Commission could more thoroughly investigate railroad operations at all times. That portion of the paper which recommended the Cullom bill was indorsed by the convention, but on the other features the convention passed no opinion.

The convention once more unanimously indorsed the proposal to compel the adoption of uniform freight classification, and adopted a report of the Committee on Safety Appliances indorsing the use of electricity for lighting locomotive headlights. Whether this refers to lights of 2 candle power or 2,000 candle power does not appear.

A resolution was adopted indorsing bills now before Congress (S. 2,999 and H. R. 5,339), introduced by Senator Nelson and Representative Eddy, designed to hasten the action of courts on cases involving the enforcement of orders of State Railroad Commissions. It was also resolved that orders of the Interstate Commerce Commission ought to go into effect in 30 days, unless appealed from.

The next convention will be held at Denver, Col., Aug. 10, 1899. A permanent organization was formed, with C. J. Lindly, of Illinois, Chairman, and E. A. Moseley, of Washington, D. C., Secretary.

Demurrage vs. Switching Associations.*

The word "Demurrage" as used in Maritime Law is defined in the American Encyclopaedic Dictionary as: "The time during which a vessel is detained by the freighter beyond what is named in the charter party in loading or unloading." In railroad law it means a similar compensation or allowance "payable for delay in loading or unloading cars beyond a certain specified time allowed for the purpose." Where in practice a demurrage charge was applied when a vessel was detained, the amount was determined by the earning capacity of the vessel during the period of detention; consequently where demurrage is applied to a car, the amount of compensation for its detention should be in accord with its possible earnings. To within the last ten years, it was in dispute as to whether a railroad was entitled to compensation in case of detention of its cars. . . . The control of car-service associations is in a local Board, who elect a Joint Agent and turn over the authority of the association to him as Manager. He must define the agreement and apply the rules. It is unfortunate

*Abstract of a paper read before the St. Louis Railway Club, May 13, 1898, by W. M. Prall, Manager of the Central Car Service Association.

that in the beginning every individual association defined its duties as to the collection of a demurrage charge, but ignored the necessity for regulating the switching service.

Let me define the difference between a demurrage and a switching bureau. A large industry, with adequate trackage, fully equal to any demands that should be made upon it, continually complains of improper service. The industry receives cars irregularly from the railroads, so irregularly that there is a continuous surplus on the railroad hold tracks. The consequence is that the Superintendent of the industry furnishes a switch list to the yard master of the cars that he desires placed. The railroad, from a mass of cars destined to a dozen different industries, switches out those desired. The congestion, however, never grows less, as all cars as received of necessity must gravitate to the hold tracks, there to be switched and re-switched before final delivery. Then the demurrage remedy is applied, under the well known 48-hour rule. This does lessen the detention to the cars while on the tracks of the industry; but, is the industry benefited? Unless there is a benefit to the industry certainly there will be opposition to the regulation. Cars on the hold tracks are not charged on arrival, consequently the industry and all its competitors and the miscellaneous consignees hold cars indefinitely, ordering them to tracks to suit their convenience. The result is a continuation of the old conditions.

Under proper switching regulations, the conditions would be as follows, as demonstrated during the past five years at St. Louis: The industry is notified of the arrival of all cars that the railroad is unable to place on the proper sidings because the sidings are full of other loaded cars, and they are charged with such cars just as they are with the cars actually placed on the sidings. Then the consignees, knowing their responsibility, endeavor to unload the cars on the sidings so that the outside cars can be placed and unloaded before the penalty applies. Cars are moved to the siding in rotation as received, the industry finding gradually that the quicker they unload the cars delivered, the better the service from the road. The more car service they pay, the poorer service they will receive, because if they pay car service the railroads must necessarily hold some cars on their hold tracks.

There is no dispute as to the immense saving effected by the prompt handling of cars, and no place where the saving is so fully demonstrated as at a large terminal. Regularity in delivering engenders regularity in unloading. This is not a theory, as it has been practically demonstrated. Many industries are ready and willing to bear evidence to the benefits from the application of switching rules.

A car service association must be something more than a demurrage bureau. The Association's success is entirely dependent upon car movement, the success being proportionate to the quickness of the movement. A large success is secured only when the public generally are perfectly satisfied with their service, understanding the reasons why the rules are applied. If the various commercial bodies of the United States fully appreciated the immense additional taxation to them arising from the failure of the railroads to use common sense rules for car movement, there would be a great protest.

In the competition for freights, the railroads have organized traffic associations and have bound themselves to certain regulations, such as those for maintaining rates, but the strength of a chain is the strength of its weakest link, and as these associations fail to provide a penalty for not unloading cars within a reasonable time agreements for impartial rates fail of their object. . . . There has been an overbuilding, both of warehouses and hold tracks, at many important terminals, the over-building adding to the expense of operation.

A Scheme for Heavy Electric Traction in Paris.

We described April 1, page 338, the plans of the Orleans Railroad for a new terminal station in the heart of Paris, involving about four kilometers of new line, 650 meters in the open and the rest in tunnel. For the particulars of construction, etc., the reader is referred to that article.

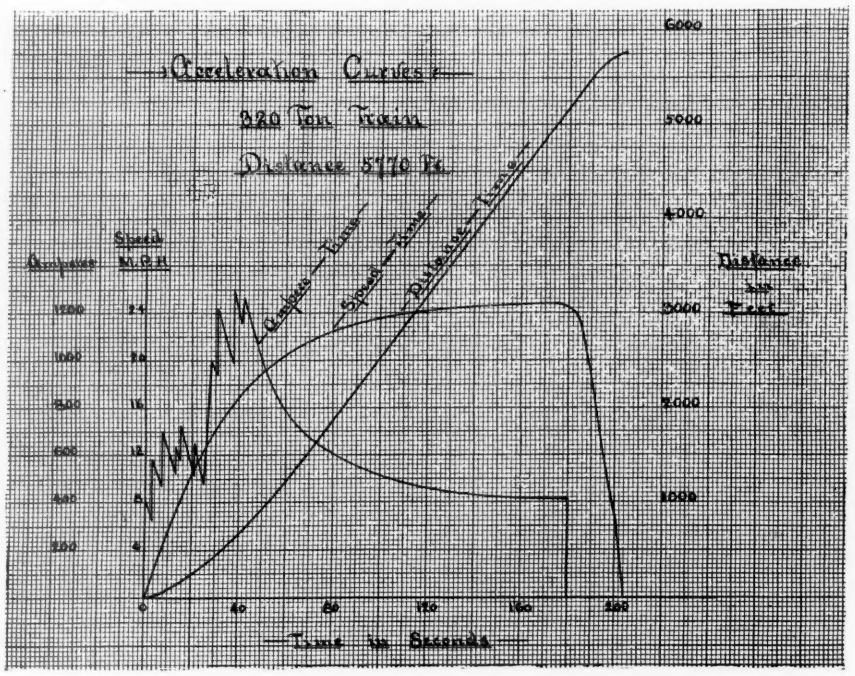
It is proposed among other plans to work this new city line by electric locomotives driven by continuous current at between 500 and 700 volts, using the third rail system of contact. In asking for estimates, however, the company has requested bidders to submit plans also for the use of systems of generation and distribution other than that just mentioned.

The locomotives are to be eight in number, all alike, and able to haul a train of 250 French tons in seven minutes between the stations of the Quai d'Orsay and the Pone d'Austerlitz without stopping at the intermediate station of the Pont St. Michel. This means a speed of 45 K. M. an hour. The locomotives should not only be able to haul a train of the weight mentioned on a grade of 1.1 per cent and on curves of 200 meters radius, but it should also be able to haul trains as heavy as 300 tons at a slower speed. The locomotives must be built to move in either direction at the same speed, and be of a length to allow them to be turned on turn tables 6 m. 20 C. M. in diameter. They are to be equipped with motor driven air pump and air brakes.

The generating station will be of capacity to allow of the simultaneous movement of four 200 ton trains, exclusive of the locomotive, and must include sufficient lighting capacity for three stations and the tunnel, as well as for the station and shops at Ivry. The current is to be taken by the locomotives from an insulated third rail at the side of the track in the stations and between the tracks over the rest of the line, due provision being made for all switches and cross overs.

The Orleans Company recently sent over to America a corps of engineers to investigate the different electric railroad installations of this type in this country. The party was headed by H. E. Solacroup, Assistant Chief Engineer of Material and Traction, and M. Sabourot, Chief Engineer of Central Service. Their inquiries were conducted very quietly, but during their short stay they were able to visit almost every installation of special interest to them in the United States.

The investigation was begun at Hoboken, where an electric locomotive is hauling freight between the transatlantic docks there and the West Shore and Erie Railroads. From there they visited Baltimore to inspect the electric locomotives which operate the B. & O. through the Belt Line. From Baltimore they went to Chicago, and, returning East, passed through Cleveland, Niagara Falls and Buffalo, where they had an opportunity of studying the employment of the electric car in high speed interurban service.



A Test of Electric Traction Made for the Engineers of the Orleans Railroad.

From Buffalo they traveled to Boston, where they were met by C. P. Clark, President of the New York, New Haven & Hartford Railroad, and Col. N. H. Heft, Chief Electrician of the same road. They traveled over the Nantasket Beach branch of the New Haven system between East Weymouth and Hull and inspected the power house. Returning, they visited the third rail electric system between Berlin and Hartford, Conn., opened for traffic last Summer, and rode on the 30-ton electric locomotive operating between factories at New Haven and the Cedar Hill Junction.

A special test was arranged for their benefit at Schenectady on the experimental two-mile track of the General Electric Company, the conditions of the track and load being, as far as possible, similar to those which will obtain on the line in Paris. A length of track was marked off 1.11 miles long, by two white flags, corresponding to the distance between the Quai d'Orsay and the Pont St. Michel stations, the most difficult portion of the proposed Orleans extension. According to the time schedule arranged for the operation of the road this distance should be covered in three minutes and fifty seconds. A train was made up of a motor car of the Nantasket Beach pattern, equipped with four G. E. 55,175 H. P. motors as locomotives, several New York Central coaches and seven flat cars loaded with pig iron, making a total train load of 320 tons, including the motor car, which weighed 45 tons. The run between the flags, including starting and stopping, was made easily in three minutes and twenty-five seconds, giving a margin of not less than twenty-five seconds to the good. The diagram on this page shows the acceleration curves of this run.

The question of rendering the third rail inert after the passage of the train having been brought up, the General Electric Company arranged an exhibition of its method of effecting this result. A section of the third rail was measured off and divided into sections in lengths varying from 30 ft. to 500 ft. Connections were made between these and a system of automatic switches, and the conditions of the General Electric system of surface contact almost exactly reproduced. As a visual means of indicating that the third rail was alive a number of incandescent lamps on the top of the boxes containing the switches were connected to the conductor. As the car reached the sections and rendered them alive, the lamps lighted up, being extinguished as the contact shoes passed over the dividing lines between the different sections.

National Association of Car Service Managers.

The ninth annual meeting of this Association at Columbus was briefly reported in our issue of May 27. Members who have returned report that this was one of the most enjoyable and profitable conventions ever held. Manager J. D. Berry, of Columbus, did many things for the comfort of members, and the Columbus Division of the Central Association of Railroad Officers convened in adjourned session to receive the car service managers and their ladies. President Whittlesey, of the Central Association of Railroad Officers, speaking for the great central West, paid a high tribute to the usefulness of the Car Service Associations. He said, among other things, that their operation had been the means of improving discipline among agents and train men.

The first business session was on Tuesday at 2 p. m., President A. L. Gardner, of Baltimore, in the chair. Papers were read as follows: "The Use of Telephone for Giving Notice and Otherwise Facilitating Car Movement," by J. C. Loomis; "Billing Forward Free Time," by William M. Prall; "Car Service Rules Before the Interstate Commerce Commission," by J. E. Challenger; "Is Diversion in Transit Sufficient Cause for Refund of Car Service Charges?" by J. C. Haskell. We expect to give abstracts of these papers in a future issue.

The salient points presented in these papers were generally discussed. It was the consensus of opinion that, while the telephone might be advantageously used in many instances, written notice should always follow by mail or messenger.

In regard to Mr. Haskell's paper it was—

"Resolved, That in the opinion of this Association no claim for refund of car service charges, based on alleged diversion in transit, should be made by the delivering line when it has not been cognizant of the diversion, or willfully participating in same."

On motion of Mr. Taylor, seconded by Mr. Fetter, it was—

"Resolved, That it is the sense of this Association that no car service should be refunded accruing on shipments rejected, unless the detention is due to negligence on the part of the carrier."

The Committee on Export Freight reported that the Southeastern Car Service Association had adopted car service rules covering export freight at Brunswick, Ga., similar to those in force at New York and New Orleans.

The question of private cars on private tracks was discussed at length, and it was the sense of the members present that in all cases, except where both car and track are owned by the same private party, the

rules should apply and charge be made. It was ordered that the Secretary have printed the information in the hands of the committee, showing the rule and practice of the various associations on this point.

Mr. C. O. Hunter's paper on "The Legal Status of Car Service Rules" was ordered to be printed in pamphlet form for general distribution.

London Underground Railroads and Electricity.

In recent issues we have referred to the proposals made from time to time for operating the Metropolitan Railway Co.'s underground lines by electricity. The company has not yet accepted any scheme, nor does it appear likely to do so in a hurry, though steps have been taken to secure the necessary Parliamentary powers to enable the directors to set apart a certain sum from the funds for the expenses connected with the conversion.

The Metropolitan District Railway Co., which uses some of the Metropolitan Company's tunnels, has now followed suit by promoting a similar bill. The chairman, Mr. Staats Forbes, explained its objects to the shareholders on May 17. He said that as soon as they saw their way to carry out the matter under the powers of both companies, and to use electric traction, a beginning would be made on the Inner Circle line. Electric traction, however, was not a matter they could enter into with absolute indifference respecting the question of cost. A good deal was already known about that matter. They were informed by two very eminent authorities that the financial burden of the two companies in connection with the adoption of electric traction would be extremely moderate in comparison with the great advantages that would thus be secured. They would not only get rid of many of the offensive characteristics of the air in their tunnels, but there was a saving in cost of traction which was estimated at something considerable. There were a good many speculative people who were ready to carry out the change, but at the company's risk.

Sir J. Wolfe Barry, who had been connected with the District Company for many years, and Mr. W. H. Preece, C. B., F. R. S., Electrician-in-Chief to the General Post Office, have the matter in hand. The directors will not proceed far until these gentlemen assure them that it is safe to go on. "In a year or two," said Mr. Forbes, "we shall have a good deal more experience, because the greatest electrical enterprise in England yet brought to anything like development, the Central London Railway, will then be in operation. That is an object lesson the directors will wait for," as they did not intend to commit the company until they saw their way thoroughly in the matter. The above statements, we suppose, may be taken as applying to the lines of both companies.

Dickson Locomotives for India and Japan.

By way of illustrating the variety of locomotives which our builders are now turning out for export trade we show two small engines recently built by the Dickson Locomotive Works. One of these, the 4-wheeler, 3-ft. gage, goes to Calcutta, and two 6-wheelers, 42-in. gage, are for the Sanyo Railroad of Japan. The weights and principal dimensions follow:

Dickson Locomotive for India.

Fuel	Bituminous coal
Gauge	3 ft.
Type	4-wheel connected, side tank
Weight on drivers, lbs.	12,100
Weight of engine	12,100
Driving wheel base	3 ft.
Total wheel base	3 ft.

Cylinders.

Diameter	5½ in.
Piston stroke	8⅞ in.
Main rod length, center to center	29 $\frac{5}{16}$ in.
Valves	plain

Boilers.

Type	Straight top
Steam pressure	180 lbs. per sq. in.
Diameter of boiler inside at smallest ring	23 in.
Fire box length	24 in.
" width	19 in.
Material tubes	Iron
Number of tubes	44
Length of tubes	4 ft. 10 in.
Diameter "	1½ in.
Heating surface, fire box	14.3 sq. ft.
" tubes	83.42 "
" total	97.72 "
Grate area	3.16 "
Material in barrel	Steel
Thickness of barrel	⅜ in.
" " fire box crown	⅜ in.
" " " side and back	7-16 in.
" " tubes	⅝ and 7-16 below tubes
Material in fire box	Copper
Crown stayed with	Crown bars
Boiler covering	Asbestos

Driving Wheels and Journals.

Driving wheels, number	4
" " diameter	24 in.
" " centers	20 in.
" " material	Cast iron
" " journals	3⅛ in. dia. x5½ in. long

Tanks.

Two tanks mounted on side of boiler.

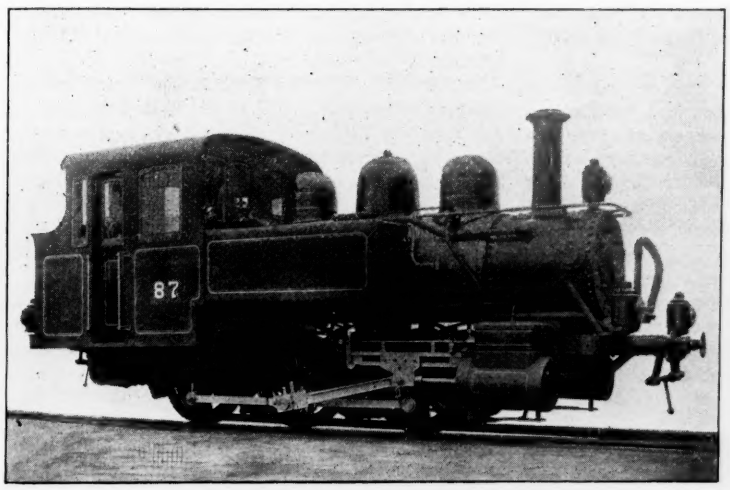
Capacity of tanks	100 gals.
" coal	500 lbs.

Dickson Locomotive for Japan.

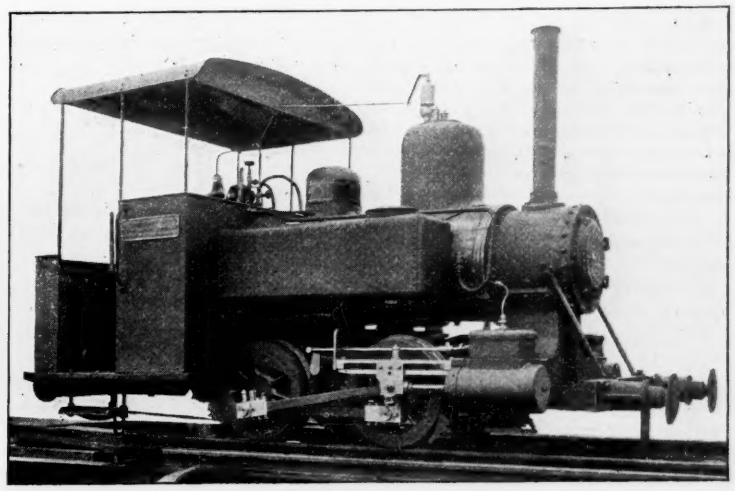
Fuel	Bituminous coal
Gauge	42 in.
Type	6-wheel connected, side tank
Weight on drivers	43,550 lbs.
" on engine	43,550 lbs.
Driving wheel base	8 ft. 5 in.

Cylinders.

Diameter	12 in.
Piston stroke	16 in.
Main rod length from center to center	50¾ in.
Valves	Plain



Dickson Locomotive for Japan.



Dickson Locomotive for India.

Boiler.

Type	Straight top
Steam pressure	150 lbs. per sq. in.
Diameter of barrel inside at smallest ring	36 in.
Fire box length	3ft. 5 $\frac{1}{16}$ in.
" width	2 ft. 3½ in.
Material of tubes	Brass
Number of "	91
Length " "	8 ft. 6 in.
Diameter of tubes	1¾ in.
Heating surface, fire box	36.2 sq. ft.
" " tubes	354.35 "
" " total	390.55 "
Grate area	7.69 "
Material in barrel of boiler	Steel.
Thickness of material in barrel	⅜ in.
" " " " fire box Crown	⅜ in.
" " " " fire box Side & back	¼ in.
" " " " fire box Tube	½ in.
Crown stayed with	Radial stays, 2 front rows slungstays
Boiler covering	Asbestos

Driving Wheels and Journals.

Driving wheels, number	6
" diameter	37 in.
" centers	32 in.
" material centers	cast iron
" journals diameter	5 in.
" journals length	7½ in.

Tanks.

2 tanks mounted on side of boiler.

Capacity of tanks	500 gals.
Capacity of coal	2,500 lbs.

Laying New Steel.

By E. A. Haskell, Division Roadmaster, Boston & Albany Railroad.

Few persons who are not directly concerned with the maintenance of railroads, realize the variety and extent of the work involved in relaying a line with new rails. From the time the steel is first received from the rolling mill until it is laid and adjusted into what is known as finished track, the process implies not only handling the rails a number of times, but also many other steps of greater or less significance. To those who have had charge of the work it possesses an interest which may not be wholly lost on other readers of this sketch.

There is naturally a considerable variation in the actual method of removing the old rails and substituting the new, depending principally upon the traffic. But it is largely a question of expediency, and in whatever way the work is done, it cannot be abridged in any essential particulars, if the standard track of our best railroads is to be attained. To describe the method on any one important line is to tell the story of what must be done on every other, if equally good track is secured. The practice of the Boston & Albany Railroad may be considered a type, and being most familiar to the writer, is the one here presented.

The rails are usually received in low side board coal cars; and the first problem is to get them out on to the ground without bending or bruising or breaking them. The best time for unloading is when the roadbed is covered with snow, which affords a cushion of the requisite softness on to which they can be safely dropped. But as it seldom happens that new steel and snow arrive at the same time, the unloading must be done as carefully as possible by dropping each rail from the cars squarely and horizontally on to the ballast between tracks, as the train stands opposite the section to be relaid. If the distributing is proceeding down grade the train may be moved a rail length after each pair has been deposited; otherwise it is customary to have the men move along the length of the train, throwing out two or more rails from each car as they proceed. In this way the rails are left nearly opposite their final position in the track. With the rails should be distributed the angle bars or other joint plates.

The next step is to "lay the steel out." As the phrase implies, this means placing the rails in their proper relative positions, and determining how and where they are to be when laid. It should be done by a competent man, for it is here that experience and skill count. There are certain cardinal points that govern the operation.

First, the joint interval should be preserved on curves as well as tangents. If square joints are the rule they should be precisely opposite each other in the two lines of rails. If alternate joints be the standard, then the joint in one side of the track should be exactly opposite the middle point of the rail in the other side.

Second, the spacing at the joints should be calculated and allowed for the probable temperature at the time of laying.

Third, the breaks in the main track at switches, should be made by using the minimum number of cut rails and avoiding all short pieces.

Fourth, rails less than the standard length should be paired off and kept together, except, of course, where one is occasionally needed on the short side of curves to preserve the joint interval just mentioned.

The rails are selected and placed end to end in line on the ballast at each end of the ties, and so arranged that the markings of the manufacturer on the webs shall all read from the outside of the track.

For it is claimed that there is a right and a wrong side to rails, and that the running or gage side should be distinguished from the other and presented to the flanges of the wheels. As a matter of fact they are designed symmetrical in cross-section and the rolls by which they are formed correspond accurately to the design. But it is asserted that with use there is a variation in wear between the top and bottom rolls, which (of course) is reflected in the rails. Yet, on the other hand, most specifications insist that the fit of the finishing or male template shall be perfectly maintained, and moreover, that not more than a certain maximum number of tons be permitted to issue in one delivery before the rolls must be remodeled. If this lack of symmetry exists at all it is quite inappreciable, taking the rails singly, but it may be possible that when a large number are fitted together there is in some cases an appearance of irregularity. At any rate, the custom has long been to place them all the same way, and therefore about one-half must ordinarily be turned end for end in the process of laying out. For this purpose a light portable turntable is sometimes used.

After the steel has been laid out the next step is to straighten the rails where they need it, and curve them for all the sharper curves. Although the specifications are very strict in this respect, and the rails carefully inspected at the mill, yet many of them are

(*Continued on page* 394.)

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

We are apt to look upon the great English railroads as "finished," they having been built originally with heavy superstructure, double tracks, without grade crossings, and complete in other particulars, in which nearly all our railroads were very imperfect in the beginning, and which those with heavy traffic have had to provide with the expenditure of scores of millions since, and for which hundreds of millions more must be spent as traffic grows. But the English railroads are not exempt from expenditures necessary to meet the growing requirements of the country they serve. The twelve principal companies, leaving out of the account an important extension which has cost one of them $43,500,000, have expended $347,413,713 on capital account, with only insignificant additions to their mileage since 1889. This is an addition of 12¼ per cent. to their total capital, yet their net earnings were only 7.2 per cent. more in 1897 than in 1889, and the increase in net revenue is but $2\frac{5}{8}$ per cent. on the increase in capital. The Economist, which publishes tables showing the results on each of the twelve lines in question, estimates that the new capital costs the companies an average of 3½ per cent., and that on this basis there was a loss of $1,708,000. This is not from any sluggishness in traffic. The gross earnings meanwhile increased no less than 19 per cent., one half more than the increase in capital, but of the great increase of $54,583,433 in gross earnings, all but $9,842,360 was absorbed by increased working expenses, which were 51.9 per cent. of the receipts in 1889, and 56.7 in 1897. We have heretofore shown that the railroads in this country have had a quite similar experience. A very large number of them have made great additions to their capital (mostly before 1893), with no increase whatever, and often with a decrease, in their profits. Here, however, the additional capital went largely, perhaps chiefly, for an increase in mileage, and the failure to grow was due to a stagnation in business, which is shown in an actual decrease in traffic and gross earnings, as well as in profits. From this stagnation we have emerged now less than a year, and the year 1898 bids fair to show a recovery of a large part and perhaps the whole of the lost ground.

Two soldiers have been killed and a number wounded in railroad collisions involving troop trains. One of these accidents was at Rossville, Tenn., near the Chickamauga camp. A train was stopped by a blockade of other trains before it reached the station and was run into at the rear by a regular passenger train. It is said that the flagman went back, but not far enough. The other accident was at Way's, Ga. This was a butting collision; the troop train was the fourth section of a regular train, a fruit train was waiting on a siding, and it was the old story of the train crew pulling out between the sections of the passing train. Naturally, they have aroused the country editor. One editor wonders why railroad men do not realize the tremendous responsibility that they take in carrying the defenders of the Nation's honor. Another one declares that negligence and incapacity must be severely punished. Even the Secretary of War has got excited and orders the railroad responsible for the Rossville accident to be immediately prosecuted. Probably none of these gentlemen, except perhaps one or two of the country editors, take themselves seriously in this matter; but gallery play, and especially against the railroads, is supposed to be attractive to the public. And perhaps it is, although we take it that anybody who stops to think twice will realize that no new kind of accident has happened and that no new kind of discipline is called for. If a railroad officer ought to be prosecuted for killing a soldier he ought also be prosecuted for killing a civilian. We see no new lesson to be drawn from these accidents. It is according to the doctrine of chances that the more trains are moving over a road the more accidents there will be, always provided that the methods of protection remain the same. We naturally revert to the space interval as a means of preventing such occurrences. Years of discussion of these matters in the American Railway Association and elsewhere has led many of the best roads to the conclusion that the true remedy for butting collisions and rear collisions on a single track railroad is the absolute telegraph space interval; that is, the block system. The most appropriate comment that we can think of is the record made by the Southern Pacific and other Western roads last summer in carrying the thousands of Christian Endeavor excursionists to San Francisco. The Southern Pacific (and some of the other roads) had few regular passenger-train men and had to impress into that service all the freight men; but the space interval was adopted and every passenger went through in safety. At Way's the objection to the space interval will be that it was necessary for trains to meet in the night at a non-telegraph station. The conductor tried to get the day operator to come to the office, but he was sick. To meet this objection it seems to us that the practice of the Chesapeake & Ohio is worth study. On that road the space interval is in force, but, when deemed necessary, trains are allowed to meet at a non-telegraph station by having the train dispatcher issue a positive meeting order for each case. This practically eliminates the time interval.

The Effect of Excessive Clearance.

Some important facts, having a practical bearing, have recently been developed in connection with certain tests of the new eight-wheel experimental locomotive at Purdue University, which tests were made to determine the effect of high steam pressures on the engine efficiency. This locomotive was illustrated in our issue of December 17 last, and it will be remembered that it has a boiler capable of carrying a working pressure of 250 lbs. per sq. in., while the cylinders are 20 by 24 in. reduced by bushings to 16 in. diameters; the cylinders are so designed that their diameters can be varied by the use of different size bushings. The arrangement is therefore such that when used as a 16 by 24 in. engine the clearance spaces are those of a 20 by 24 in. engine.

In the tests referred to it was found, first, that the efficiency of the cylinders of the new locomotive, even with very high steam pressures, was considerably less than that given by the former locomotive, Schenectady No. 1, which carried a boiler pressure of 140 lbs. per sq. in.; and second, that the cylinder efficiency appeared to be but slightly increased by raising the steam pressure. The reason for this unexpected result was found to be due to the excessive clearance of the new bushed cylinders, and the effect of the clearance on the efficiency was so marked as to render unreliable any definite conclusions as to the ultimate economy to be got from the use of high pressures under more favorable conditions. The important point which has largely been lost sight of is that the extent of the surface exposed in the clearance spaces is one of the most important factors entering into the total cylinder efficiency of simple engines. The results also indicate that to get the full benefit of high steam pressures and at the same time avoid excessive clearance losses, compound working will likely be found essential.

On the supposition that the efficiency of the engines proper is considerably increased by the use of high steam pressures, on many roads it has become a common practice in rebuilding old locomotives to replace the boilers, which formerly carried pressures of from 120 to 140 lbs., by new ones capable of withstanding pressures of from 180 to 200 lbs. per sq. in. This change in most cases made necessary the use of cylinder bushings to maintain the proper proportion between the cylinder and tractive power, so that in the end a condition was reached quite similar to that of the new Purdue engine, and it is reasonable to assume that the greater part of the reported fuel savings from these changes can now be accounted for by the loose methods used in measuring coal and the desire to make a good showing. We understand that these facts will be brought to the attention of the Master Mechanics' Association at the coming convention, and they will no doubt form a basis for an interesting topical discussion.

The Care of the Public.

A few months ago an Englishman who knows a great deal about railroads in several lands sat in the cab of an American locomotive while it made a run of over fifty miles at more than sixty-two miles an hour, touching seventy-five miles an hour more than once during the run. The day was fine, the tracks stretching away in the sunlight were well guarded by the faithful signals, the engine did its work sweetly and rode so smoothly that one could write in the cab with some ease. Altogether the journey was not merely comfortable, but exhilarating.

But several times the Englishman turned to the Yankee behind him with an expression of horror, and then the Yankee would see a child or a group of children crossing the track or playing about, much as silly boys sometimes bedevil a bicycle rider; and it was horrible to see children or even grown-up persons on the track only a few yards ahead of a locomotive going through space at the rate of 110 feet a second.

When he got down the Englishman admitted all that anybody had to say as to the mechanical merit of hauling a seven-car train for such a distance at such a speed, but he said that our carelessness about human life was barbaric. Obviously, it could not exist in a really civilized country. Apparently, he was right. It seems to be a fair proposition that one good test of the civilization of the country is the scrupulousness with which it protects the lives and property of the ignorant, the innocent and the feeble while leaving to everybody the greatest freedom of action. But in the case in point, who is the barbarian, the railroad that runs sixty or seventy miles an hour while children are playing and grown people are walking on the tracks, or the community in which such things are possible?

With the railroad company it is not a brutal disregard of human life, but the attempt to give what the community wants under the conditions which the community imposes. There is no railroad manager or superintendent or director or president who does not wish with all his heart that he could avoid the lawsuits for damages, the dangers of derailment and the offense to local feeling, which are part of this uncontrolled and reckless use of railroad tracks. But he is working within limits that other people have set.

The speeds cannot be lowered. The public asks to be carried faster and faster. It would be to the interest of owners of railroad securities if the officers managing their property could agree not to compete in speed or frequency of service; but the tendency of legislation and of decisions is to make it harder to keep up such agreements, and public opinion in America or in England either would not long tolerate such agreements. Continental nations accustomed to State control and State working can put up with what they call express speeds of thirty miles an hour, but the English-speaking people have worked up to a standard far beyond that, and it is impracticable to work them down again.

But if we must run so fast we can at least have gates and patrols and keep people off the tracks. This is easily said, but it is only partly true, and to a very limited degree. The cost of complete protection of crossings by gates and watchmen would be impracticable for most railroads of the United States. But even gates and watchmen are only partially effective. Children—and grown people, too, for that matter—will slip under or dodge around gates in spite of the watchmen, and there are few places where they cannot get on the tracks between highway crossings. Some day public opinion will be educated to the point of helping the railroads to protect their tracks against trespassers. But now every American citizen thinks that he has a vested interest in every foot of railroad right of way, and

there are few so intelligent or judicious that they would not resent any attempt on the part of the railroad company to cause the arrest and fine of persons trespassing on the right of way. One result is the death of over 3,000 people killed every year because they are on railroad property, when they have no business to be there.

The Security Market.

The improvement in the security market, which set in immediately after the Manila victory, has continued almost uninterruptedly. It has gained in force as time has gone on, and some noteworthy advances have been made, while practically all issues dealt in on the New York Stock Exchange record materially higher prices. The war, as a factor in the security markets, has been of diminishing importance during the past month. Of course, a decided military advantage gained would be the occasion for a jump in the upward movement now governed by normal considerations, and a reverse would unsettle prices. But the latter possibility receives no attention. Wall Street has made one of its sudden reversals of opinion, and will hardly consider military operations. It now pays attention to the attractive story of unprecedented exports; bank clearings, which have reached totals beyond the previous maximum figures of 1892, and railroad earnings, showing increases of 15 and 20 per cent. over last year, and higher figures than in any other year.

As the great prosperity of the country is based, first of all, on agriculture, the benefits to the grain-carrying roads is most readily appreciated by the Wall Street public, and seems more conspicuous than the improvement in earning powers by the railroads in other sections of the country. It is quite natural therefore that the granger railroads should absorb the larger portion of the dealings in railroad stocks. Among these the Rock Island shares have been conspicuous for the rise. This has been due partly to astute management by powerful interests in Wall street, and in part to the excellent showing anticipated in the annual report made public this week, but particularly to the expectation of increased cash dividend distributions and the declaration of a scrip dividend. Rock Island stock sold around 84 in the last of April, and at 107¾ on Tuesday of this week, the day before the annual meeting.

This gain, while most striking of all the gains made by the granger lines, is not the only material advance made by the shares of the grain carrying roads. St. Paul common stock has risen 13¾ points, crossing par on Tuesday last and selling at 101; Burlington, quoted at 104, is up 11 points from the price of the Saturday before Admiral Dewey's victory, while Chicago & Northwestern and Omaha common stocks have each advanced about 11 points, to 129½ and 79½, respectively. Taking stocks which range within a narrow limit of prices, it will be found that even in these decided advances have been made. During May, for instance, New York Central stock has risen 8 points since April 30, to 117⅛ on May 31, which is also the closing quotation on that day for Pennsylvania stock, which, however, has had to advance only 4 points to reach that figure. Lake Shore is up 8 points to 190, and Michigan Central 4¼ points to 105½. These are all dividend paying properties.

Stocks which so far are only dividend possibilities, have not made such decided gains on the whole, although the appreciation in these is also substantial. Louisville & Nashville, at 56¼, has gained 9 points; Erie first preferred at 36¼, is 4 points above the opening price in May; Atchison preferred is 6⅝ higher, at 32¾; Big Four common, which sold at 27½ on April 30, is now quoted at 35; Northern Pacific preferred, which pays quarterly dividends of one per cent., has gained 5 points to 67½, and Union Pacific preferred which Wall Street thinks will be paying as much before the year is out, is up about 8 points higher at 60⅞.

Metropolitan Street Railway stock is so speculative that its advance of 30 points in May is not unfamiliar and is hardly significant, but the rise of nearly 34 points in Great Northern preferred, is one of the striking events of the month. This was based on propositions to divide among these stockholders certain free assets of the company, and the retirement of the collateral bonds by preferred stock, the present holders of the stock to be allowed to subscribe for the additional issue at such a price as will constitute a valuable privilege to the stock. These plans have not yet been unfolded in their entirety. They have, however, been notified of what is practically a dividend of 50 per cent. in the stock of the Seattle & Montana, one of its coast lines, and formal notice is published of the proposed retirement of the collateral trust 4 per cent. bonds.

The bond market has naturally varied within a much narrower range of prices. But the improvement has been general, and in certain instances very considerable. The better tone of the market is, perhaps, as much shown in the wider demand for miscellaneous issues, as in the range of quotations. During May a considerable number of bond issues in which there have been no dealings since the decline following the Maine explosion, have again become fairly active, and as a rule, at higher prices than last quotations, but there are numerous exceptions to this. A few instances of the advance in bond quotations will show the general improvement.

Atchison general fours have advanced 5¾ points, and the adjustment bonds 6⅞ points. Chesapeake & Ohio 4½s are up 6¼ points to 81¼; Erie prior fours are 91¼, an advance of 6¼ points, while the 3-4s are quoted at 73¾, a rise of 6¾ points. Reading fours have advanced 4 points to 84¼, and Union Pacific fours 4⅝ points to 94⅞, while Northern Pacific prior lien fours have gained 5⅛ points in the month and are now 96⅛.

Freight traffic managers have often been accused of making changes in rates affecting important interests of shippers without giving the shippers reasonable notice. Railroads have often suffered by such action, neglect to consult shippers having resulted simply in a forced restoration of former rates. But this state of things has gradually been done away with, and we now sometimes see the other extreme. A committee of the Trans-Continental Freight Bureau has lately been holding a protracted meeting at Milwaukee to revise rates on freight from the Eastern and Central States to the Pacific Coast, and it has been haunted for two weeks by wholesalers from California and the representatives of other wholesalers from Chicago and St. Louis. When merchants have to travel 2,500 miles and stay two weeks in order to get justice, or what they think is justice, one is inclined to wonder whether we are not drifting into a condition where such questions as 10 per cent. changes in the freight rates on baking powder and hooks and eyes will have to be settled by the Supreme Court of the United States. Such moderate changes as were proposed in the California rates can have but the very smallest influence on the cost of the goods to the consumer or on the fortunes of the producer, but the interests of jobbers in California, who make their living out of the profit that can be got off the difference between carload and less than carload freight rates on their goods from the East, have become so clearly defined and crystallized that they succeed in making a square fight against the Eastern dealers, who can sell the goods directly to the California retailers if the rates on small lots are not much higher than on carloads. In former times, or in territory less dependent on distant markets for important commodities, rate questions of this kind have been left to adjust themselves, but with the issue well defined there is nothing to do but fight it out. The presence at Milwaukee of Mr. Vanlandingham, of St. Louis, suggests that if the merchants were not well banded together and led by an experienced transportation man this contest might not be so strenuous. We do not mention this to deprecate the existence of merchants' freight bureaus; quite likely it will in the long run be an advantage to all concerned to have all issues between carriers and their customers clarified at as early a stage as possible. From the examples of rates mentioned by the Milwaukee reporters, it would seem that neither the cost of service nor any reasonable consideration of what the traffic would bear was the ruling element in deciding upon the rates heretofore in force. When the rate on small lots is 40 or 50 per cent. higher than that on the same goods in carloads the difference certainly must be based on something besides a difference in the work or risk in receiving and handling, or any legitimate competition. Even if real or pretended water competition is relied on for justification of an abnormal reduction of the C. L. rates, it is doubtful whether the reduction of these without a corresponding reduction in the L. C. L. rates could be justified before the courts, and it looks, therefore, as though the railroads would do well to make the differences smaller as rapidly as they can. According to reports, they have done just the opposite—made them larger. It is plain, however, that charging different rates to different persons for carrying the same kind of goods over the same route on the same day looks very much like unjust discrimination, and to convince a court or jury that it is not unjust it will be necessary to produce simple and easily understandable reasons. In the absence of well-defined water competition, cost of service is the only reason that comes within this class, and every one knows that cost of service warrants only a small difference.

The new agreement of the Southwestern (Traffic) Bureau, which has been published in some of the daily papers, has as vigorous and hopeful a tone as though there were no anti-trust law in the world, and as though rate-cutters had forgotten the knack of inventing new tricks as often as their old ones get found out. In spirit the new agreement could not be better. Section 1 of Article V requires the officers to discourage "reduction in rates by rebate or drawback, by payment of commissions, lighterage or cartage, by illegal rate issues as defined by legal and bureau decisions, by underbilling weights or misrepresentation of the contents of packages, by the giving of free or selling reduced passenger transportation to shippers, their representatives or employees, or to merchants' bureau, including donations to the latter in lieu thereof, by the payment of shippers' telegrams, or by any unlawful device whatsoever." There can be no question that the association. as an association, honestly designs to prevent secret and under-handed competition, whatever may be the purposes of individual members. Section 6 of the article cited gives the chairman authority to see all necessary records of individual roads at any time, and in general the spirit of the agreement is such that the President or Traffic Manager who intends to cut rates is in honor bound to withdraw from the association before he begins the cutting. But as there is nothing in these rules to indicate any change from the conditions which prevailed when Mr. Stickney, Mr. Ingalls and others declared that the honor of railroad officers acting in an association (not elsewhere) was an unknown or minus quantity, the new Southwestern agreement differs from former documents of the kind only in the fact that the man who drafted it was a more acute diagnostician of railroad maladies, and had at his command a fuller and more accurate vocabulary. We regret to see that there is a clause empowering the Chairman to impose fines for violation of the agreement. The framers of the compact undoubtedly have aimed to conform to the law, both in letter and in spirit. A clause of the preamble declares a purpose to enforce the Federal and state laws; and in Article XII. it is declared that the agreement "does not give the Bureau, the Executive Board, the Conference Committee or the Chairman the right to establish or change freight rates over the lines of any member of the bureau, nor shall it be held that any member has parted, directly or indirectly, with its sole and exclusive right to fix and control any and all rates. * * *." But collection of fines is a transfer of money from one company to another, or others, which the courts are likely to look upon in as the nature of a pool payment; and pool payments are unlawful. Quite likely the parties to the agreement have little intention of enforcing fines. But if that is the case, why include the useless paragraph?

The United States Supreme Court has granted the motion of the Attorney-General of Nebraska, for modification of the decree in the Nebraska maximum freight-rate case. The motion was to strike out the words "and below those now charged by said companies," so as to remove the sweeping prohibition of all rate reductions. It will be remembered that the Newberry law, which was the subject of litigation in these suits, prescribed inflexible freight rates for the railroads of Nebraska, very much lower than those then in force, and that the Supreme Court sustained the Lower Court in enjoining the State against putting the law in force. This injunction (see Railroad Gazette, April 15, p. 279) applied not only to the state officials, but also perpetually restrained the railroad companies from making any rates below those then in force. This absurd clause in the injunction, which seems to have been inadvertently approved by the Supreme Court, is the one now modified. Justice Harlan, in granting the motion, said:

> The general question argued before us on the original hearing was whether the rates established by the Nebraska statute, looking at them as an entirety, were so unreasonably low as to prevent the railroad companies from earning just compensation. In our examination of that question it was appropriate and necessary to inquire as to the earnings of the respective companies under the rates established by them, looking at such rates as an entirety. We did not intend by an affirmance of the several decrees to adjudge that the railroad companies should not at any time in the future, if they saw proper, reduce the rates under which they were conducting business at the time the final decrees were rendered, nor that the State Board of Transportation should not reduce rates on specific or particular articles, below the rates which the companies were charging on such articles when the decrees were entered. We did not pass judgment upon the reasonableness or unreasonableness of the rates on any particular article prescribed by the statute or by the railroad companies. If the State should by statute, or through its Board of Transportation, prescribe a new schedule of rates, the question will arise whether such rates, taking into consideration the rights of the public as well as the rights of carriers, are consistent with the principles announced by this court. Of course, the reasonableness of a schedule of rates must be determined by the facts, as they exist when such schedule is put in force.

It is announced that eastbound freight rates are to be restored June 13, except on grain, and that grain rates will be restored June 17; but the Chicago reporters hear of new grain contracts to New York at very low rates and they doubt whether these restorations will actually take place. The agreement for the division of the grain traffic from Buffalo to New York, reported last week, seems to puzzle the reporters a good deal, and even one conservative financial editor looks upon it as an indication that rates from Chicago are going to be better maintained. It must be known to everybody that those who make an agreement on traffic from Buffalo to New York do not believe that they are infringing Federal laws, even if the goods go through New Jersey, yet it is gravely conjectured that the formation of the so-called pool means the death of the Joint Traffic Association. But the demoralization of rates from Chicago is due to the Federal anti-pooling and anti-trust laws, which do not affect a Buffalo-New York agreement. If, as is now reported, the urgent ex-

port demand for grain is abating, the Joint Traffic rate from Chicago will be of very minor importance until autumn. The Supreme Court of the United States has adjourned for the summer without deciding the Joint Traffic Association suit. This prolongs the life of the association for a few months, but as the two laws just mentioned make that life worthless for rate maintenance, the speculations of the reporters would seem to be wasted.

NEW PUBLICATIONS.

Index to Railway Legislation of the Dominion of Canada. Compiled by J. E. W. Currier, Ottawa, 1898. For sale by the Carswell Company, Limited, Toronto. Price, $1.50.

This index embraces all public and private legislation concerning railroads, including street railroads, from 1867 to 1897, inclusive. Mr. Currier is Private Secretary to the Minister of Railways and Canals, and evidently has done his work with care and intelligence. There is a supplement giving a list of telegraph, telephone and cable companies which have been incorporated within the years named, and another giving a list of orders of the Governor-General which have the force of law. In addition to all these, the book contains a table showing cash subsidies paid to railroads, a detailed list showing the location and length of each division of every existing railroad, the interlocking signal regulations, forms of petitions for railroad and private bills and other similar matter.

The Power Catechism.—Correct Answers to Direct Questions Covering the Main Principles of Steam Engineering and the Transmission of Power. Octavo 226 pages; illustrations and index. New York: The Power Publishing Co. 1897. Price $2.

The Power Catechism is a compiliation of questions and answers from the regular issues of "Power," and is intended for special assistance in preparation for examinations. It covers boilers—their classification, setting, construction and fittings; combustion and steam making; steam piping; engines—their rating, construction and care, and the transmission of power. These, and allied topics, are treated in a series of 761 questions and answers. The method is simple and concise, and the book will be very useful to those for whom it is designed. The man who reads it through carefully once a year will have a pretty good education.

Proceedings of the Fourth Annual Meeting of the Society for the Promotion of Engineering Education, held in Buffalo, Aug. 20 to 22, 1896. Edited by Professors Henry T. Eddy and C. Frank Allen; published by the Society. Price, $2.50.

We have just received from this Society Vol. IV. of its proceedings, giving the full account of the Buffalo meeting, which was reported at some length in our issue of Sept. 4, 1896. This volume also contains a list of officers and members, and the constitution of the Society. The book is provided with a full index and table of contents, which add to the value of the publication. Among the topics considered at the Buffalo meeting, and which are now bound for distribution, are the following: "A Quarter Century of Progress in Engineering Education;" "The Elective System in Engineering Colleges;" "Entrance Requirements for Engineering Colleges;" "Study of Modern Languages in Engineering Courses," and "Credit for Shop Experience in Entrance Examinations." The book can be obtained from the Secretary, Prof. Albert Kingsbury, Durham, New Hampshire.

TRADE CATALOGUES.

"Wonderland, '98," by Olin D. Wheeler, a description of the territory reached by the Northern Pacific Railway. Price 6 cents; Charles S. Fee, General Passenger Agent, St. Paul, Minn. As indicated by the inclusion of the year in the title, the Northern Pacific's passenger advertisement has been rewritten for this year, and there are new pictures. For beauty in design, typography and illustrations this pamphlet of more than 100 pages equals anything that we know of in the same field. The descriptive matter is restrained in tone, interesting in subject and of considerable literary quality. There are maps of the Yellowstone region and of the Northern Pacific Railroad, together with a chapter on Alaska and the Klondike. There is also a chapter devoted to the cost of journeys in various directions.

Summer Homes Among the Mountains.—This is the title of a guide to summer resorts in Connecticut and Eastern New York, which has been issued by the Philadelphia, Reading & New England Railroad. The book is quite ambitious in size for what, in the language of the author, is a "cross country railroad," the text and full page cuts filling 175 pages. The cuts, all made by direct process from photographs, are excellent, and the embossed cover of the book is in the best of taste. The text, describing villages, scenery and boarding houses, is modest, sane and dignified, qualities not always conspicuous in such books.

The Standard Pneumatic Tool Company, Marquette Building, Chicago, has sent us a circular illustrating the various pneumatic devices it is now putting on the market. Among these are a small piston air boring machine for wooden freight car work, a pneumatic hammer and a pneumatic blow-off cock. The boring machine is made in three sizes, weighing 20, 18 and 8 lbs. respectively; the largest size will bore holes 3 in. in diameter, the next size 2¼ in. and the smallest tools will bore 1 in. holes.

The Drexel Railway Supply Company, Fisher Building, Chicago, has issued a circular giving a description of the Trier folding grain door which it is now putting on the market. This grain door is so suspended from chains at either side that when not in use it can be swung up out of the way and fastened by suitable hooks to the underside of the car roof.

Laying New Steel.

(*Continued from page* 391.)

not perfectly straight. Some have long bends, others short kinks, and some a combination of both. These faults are not always perceptible to the careless observer, but are readily detected by a skilled trackman, and if not remedied will hurt the appearance of the track in the eyes of a competent judge. The kinks can best be removed by using a screw rail bender, or "Jim Crow," and the longer bends or curves by a roller bender, one that works with a cam, or a hook and lever. By the same method and with the same tools that the long bends are removed where not wanted on the tangents, the rails are curved, if necessary, to conform to the curvature of the alignment. The most common practice is to begin with 2 degree curves as a limit, and curve for them and all others sharper.

Every rail receives the critical inspection of the foreman of this work, and when accepted by him is either absolutely straight or accurately and uniformly curved, according to its location in the line.

If the bolts and nuts and spikes, and the frogs and switches and their belongngs are all on hand, the steel is now ready to lay. But the ties must first receive attention. Unless plates were in use, the old rails have cut into many of the ties, producing shoulders at the edges of the flanges, which must now be adzed off to a level surface in order to give a good bearing to the new steel. If this is done as thoroughly as possible much time will be saved when the actual operation of laying is going on.

When all is ready arrangements are made with the operating department to give up the track, and a day is set for "laying." Heretofore a gang of twenty-five men has been ample to perform all the preliminary operations, some of them requiring much less than that number; but now it is more economical to assemble a large force, and the greatest number of miles that can be properly laid should be covered at one time, while the track is temporarily thrown out of service for this purpose. A fair day's work is from three to five miles, depending largely on the number of switches encountered, and as many as eight and ten miles have been laid within working hours. It may be of interest to state here that Mr. T. J. Sullivan, Roadmaster of Division Three, holds the highest record on the Boston & Albany Railroad, having, on June 27, 1897, laid 10 miles, lacking 384 ft.

Mr. E. E. Stone, formerly Roadmaster of Division Two, and now Assistant Chief Engineer, has the next highest record, of eight miles, in somewhat less than the full working day of 10 hours.

Much depends on getting a good start early in the day. With this in view every man must have his work planned for him in advance, know just what he is to do before he gets on the ground, and be provided with the proper tool when he arrives.

There can be no delays waiting for single track to be made or for the proper movements and disposition of the work train bearing the men and tools. All must have been so nicely timed beforehand that when the button is pressed the machinery will move with precision and certainty.

The first gang to start is the "spike pullers."

Assuming that we are to have 200 men in all, about 40 should be allotted to this work.

Every spike except in one row, viz., the inside of the right-hand rails, must come out or be obliterated by driving into the tie if its head breaks off; and so this gang is divided into three lines, each confining itself to one of the three rows to be pulled. There is also a further subdivision depending upon the style of claw bars; one set of men starting the spikes up an inch or more from the base of the rail with a bar of small curvature at the claw, and the other set pulling them out with a goose neck bar, or claw of larger radius. There should be enough spike pullers to keep well ahead and out of the way of the gangs that follow, since on these first largely depends the progress of the work.

Next behind the spike pullers come men with straight bars who throw the old rails out. Six or eight men are enough for this work, one-half to each line of rails. The old rails are not unstrapped, except at long intervals, but are thrown out of their old beds and off the ties in long snakelike lines, just inside the new rails ready to take their places.

Closely following this operation come the "adzers," 25 or 30 in number, who smooth off the old rail beds on the ties and finish the work of adzing that could not be wholly completed while the old rails were in place. With this gang are usually three or four men with brooms, who sweep off the ties and see that nothing remains to interfere with the proper bearing of the new rails.

Now come the "setting in" gangs, thirty-two in number, sixteen to each side. They pick the new rails up with tongs and set them into place, the foreman who originally laid the steel out being in charge and carrying a pail of iron shins of varying thicknesses, with which he regulates the spaces at the joints. These men are the hustlers, and should be young and strong and active and of great endurance. It is common for them to run after setting in one rail, to pick up the next, and they proceed along nearly as fast as a man walks. Sometimes two rails are strapped together beforehand, in which case the setting in gangs are doubled in number and the work progresses nearly twice as fast.

Behind these come men with wrenches putting on the angle bars or other joint fastenings, and bolting them up securely. This is slow work and requires a large force to hold the pace set by the head gangs.

Next in order, and pressing close on the "strappers," are the "spikers," working in groups of three, one man with a lining bar and two with hammers or spike mauls. Several of these groups take the right hand, or line side of the track, and spike the rails securely into place, taking great care to force them well over against the inside row of spikes, which, as noted above, was left undisturbed by the spike pullers. The larger number of spikers confine themselves to the other side of the track and are known as "gagers." In addition to a bar and hammers, each trio carries a gage. It is their duty to spike the left hand line of rails exactly the prescribed distance, i. e., the gage of the track, from the other line of rails already fixed in position. They form the rear guard of the procession and the most responsible place in the line. On them depends not only the gaging and spiking of the track, but its security and safety in every other respect. If any ties have been unavoidably displaced, they replace them; if any rails do not have a proper bearing, they tamp up the ties or shim them. When they pass on, the track is ready for use, and, indeed, before they reach home that night, trains will be thundering over it.

When a switch occurs in the line, the new frog and connecting rails are set into place by the regular gangs, and a competent foreman with about ten men, is left behind to fix it up, allowing the main body to proceed uninterrupted. With this exception the men are kept well together and no part of the work allowed to lag.

If plenty of tools have been provided, men can be drawn from an over full gang to make up a deficiency in some other. Within half an hour after the spike pullers have reached the end of the work the gagers should come up and the last spike be driven.

The work train is the first to pass over the new steel, having followed the procession, picking up all scattered tools and removing any chance obstructions that may have been overlooked.

When all is done and everything made satisfactory to the Roadmaster, who has given the work a final inspection, single track is discontinued and traffic resumed in the regular way.

The next day the section men begin to unstrap the old rails and place them in the middle of the roadbed convenient for loading; and as soon as enough are ready for a train load, they, instead of old rails, should be removed at once and taken to the storage yard.

We finished with the new steel by seeing it laid and traffic begun over it, but a great deal yet remains to be done. In fact, from the standpoint of cost the labor is not more than half completed. The first operation is to respace the ties so as to give the needed support at the joints. Though the new rails may be nominally the same length as the ones they displace, yet in going any considerable distance there is enough variation to change appreciably the location of the joints. Odd lengths, too, are often encountered. So it seldom happens that the ties in their old positions will be right for the new steel.

If supported joints are desired, a tie is placed directly under the juncture of the rails; if suspended joints, two ties are placed near the ends of the rails, one each side of the juncture, and the proper distance apart to accommodate the particular connecting device in use, be it angle bars, chair, or any one of the patented joints. This rearrangement of the joint ties will occasion a more or less extensive changing of the other ties under the rail, which, however, is not always fully carried out. But when it is remembered that the spacing now made will obtain as long as the steel lasts in this track it should not be considered time wholly thrown away if some pains are taken to introduce regularity and symmetry into this feature of the work.

Immediately after, or co-incident with the spacing of the ties, the tie plates are put on, if they are to be used, and the track is re-spiked accurately to gage. It is now ready for surfacing. This should

be done in a thorough manner by raising slightly and tamping every tie.

Finally the track is carefully lined. While these urgent and important operations of spacing, surfacing and lining are going on, two other matters must be attended to on the railroad with which we are concerned. The first is the bonding of the rails for the electric circuit that operates the automatic signals, and the second is the securing of the rails to the ties by check plates (as they are called) to prevent them from creeping. To bond the rails a small hole is drilled through the web at each end just back of the joint plates and a wire inserted connecting the two adjacent rails. To prevent them from creeping a curved plate is bolted to the web at the midde of each rail, which, curving down over the outside flange and turning under the base, is spiked to the tie through a slot on the outside and two holes on the inside.

All that is possible has now been done to put the new steel into the most approved condition for service, and the result should be a first-class track, smooth riding and satisfactory in appearance. But it must bear heavy loads and receive rough treatment from the rolling stock. The frost in winter and the wet in summer also exert their evil effects. Everything combines to pull to pieces and destroy what has been accomplished. It is only by watchful and unremitting care that the good qualities secured can be preserved.

The Holding Power of Nails.

Prof. Frank Soule has made an extensive series of tests at the University of California to determine the relative holding power of nails driven in Douglas spruce and redwood timber. The results obtained were presented in a paper before the Technical Society of the Pacific Coast, and published in the February Journal of the Association of Engineering Societies. The tests confirm in a general way the results obtained by Prof. R. C. Carpenter at Cornell, and given in a paper before the American Society of Mechanical Engineers, June, 1895 (Railroad Gazette, July 5, 1895). The conclusion formed from Prof. Soule's experiments are as follows:

1. Cut nails for the same area hold better than wire nails.

2. The holding strength increases with the length of the nail, but not according to any simple law.

3. The pointing of the wire nail adds about one hundred per cent. to its efficiency. If slightly more pointed than they are made at present, the holding power would be increased.

4. Pointing the cut nail adds 33 per cent. to its efficiency, but it increases the tendency to split the wood. To avoid splitting, the taper side only of the cut nail might be wedged. If wedged on all four sides, it holds best.

5. Cut nails driven with wedge across the grain are only about 80 per cent. as strong as those driven with the wedge parallel to the grain. This fact does not accord with practice in driving, probably on account of the greater tendency to split the wood.

6. A nail is three times as strong when driven into the side of a beam—that is, across the grain—as it is driven into the end of it; that is, parallel to the grain.

7. The holding power of nails increases with time in the case of redwood. It is asserted by some that the tannic acid rusts the nail and thus increases its holding power. It is probable that this effect would be extended over a few months only, after which the further rusting of the nail would weaken it. The effect of time in case of cement nails does not seem to be great, and is only slightly greater in case of wire nails, but is very considerable for cut nails.

8. The tests show that all these nails lose holding power with time when driven into Douglas spruce. This probably may be accounted for by the small lateral adhesion of the fibers in this wood and their gradual yielding to the wedge action of the nail. In other words, they pinch the nail less and less with time, but it seems unlikely that this diminution would continue indefinitely.

9. In redwood a cut nail holds slightly better than a wire nail.

10. In Douglas spruce the cement nails are 1.3 times stronger than the wire nails.

11. A cement nail is slightly stronger than a wire nail when driven into redwood, but the difference in strength is small.

12. Under shearing stress cut nails are 1.4 times stronger than wire nails. There seems to be no difference in the resistance of the nails to shear in using blocks of Douglas spruce or of redwood.

13. When nailing cleats to a block, the same area of nail in the wood will hold about the same stress, whether a few large nails are used, or more small ones. The superiority, if any, is in favor of the larger nail.

14. The cut nail holds 1.33 times better in Douglas spruce than in redwood; the wire nail about the same in each, with a slight superiority in favor of redwood.

15. The holding power of a nail is not directly proportional to its surface in contact with the wood. In determining the relative holding powers, the stress per unit area has been employed, but, as far as possible, nails have been taken as nearly alike as practicable, so as to eliminate the error introduced by this method.

16. In drawing a nail, the pull seems to reach a maximum shortly after the nail starts.

17. In case of a wire nail, the applied stress increases gradually; of a cut nail by jerks and starts. The decrease of holding in wire nails after reaching the maximum is gradual, while in cut nails it falls off suddenly. Hence, a cut nail is not as efficient in holding together pieces of timber subject to vibration as is the wire nail, for the former is more easily loosened, and, being partly withdrawn, loses much of its strength. This results from the fact that the major portion of the resistance comes from the wedge sides of the nail.

18. Cut nails are more likely to split Douglas spruce, and wire nails to split redwood.

19. In shearing a cleat from a block to which it is nailed, a maximum resistance is obtained for a cleat the thickness of which is ⅜ of the length of the nail used. This agrees closely with the practice of using a nail about 2½ times the thickness of the thinner piece nailed.

20. A slight roughness on the surfaces of a nail is of advantage.

21. The cut nail is more efficient when driven into Douglas spruce, but the wire nail is more so in redwood. This fact bears out the theory as to the manner in which a wire nail holds. The lateral pressure of the redwood fibers is greater than that of the fibers of Douglas spruce, on account of the closeness of the grain of the redwood, it having 39 annular rings to the inch, as against 14 for the spruce; and this holds true, notwithstanding that the redwood is softer than the spruce.

The general conclusion from the tests is that for most uses and under most conditions the cut nail is superior to the wire nail.

TECHNICAL.

Manufacturing and Business.

The Bryant Electric Company of Bridgeport, Conn., is building a two-story power house 50 ft. square. The building has brick side walls, and the framework is of steel skeleton type. The floor of the building is supported on heavy girders and columns, which carry steel joists supporting corrugated iron arches and concrete floor. The roof has clear span trusses carrying corrugated iron covering, lined with patent anti-condensation roof lining, which prevents the condensation of moisture on the underside of the roof covering, and avoids moisture dropping on the machinery or material on the floor below. This building was designed and the steel material furnished and erected by the Berlin Iron Bridge Company.

A bill in equity has been filed in Easton, Pa., by W. C. Pullman, of the Pullman Palace Car Co., and John J. Voorhees, late President of the New Jersey Car Spring & Rubber Co., against the Bushnell Mfg. Co. of Easton, E. M. Bushnell and E. L. Bushnell, for an injunction restraining them from further performance of their duties as officers of the company and asking for a receiver.

At a stockholders meeting of the Vulcan Iron Works of Wilkesbarre, Pa., the following officers were elected: E. H. Jones, President and General Manager; Fred G. Smith, Treasurer; S. T. Nicholson, Secretary.

The Q & C Co., Chicago, Ill., reports that in order to meet the large demands made upon it by its constantly increasing trade, it is preparing to build an addition to its works at Chicago Heights.

The employees of the Taunton Locomotive Works, Taunton, Mass., have been notified that commencing with June 1 a reduction of 10 per cent. will be made in their wages.

The Simplex Railway Appliance Co. has opened an office in Buffalo, N. Y., at 658 Ellicott Square Building, with G. E. Macklin, Agent.

The Q & C Company reports that they have received from New York a large order for McKee Brake Slack Adjusters to be shipped to a railroad in Peru. They have also just shipped one of their largest power sawing machines to Sheffield, England. This machine carries a 36-in. blade and is used for cutting risers and gates off steel castings.

The six 10-wheel locomotives which the Baldwin Locomotive Works are building for the Atlantic Coast Line will be equipped with 12 No. 9 type A Hancock locomotive inspirators and main steam valves.

Chicago grain doors, made by the Chicago Grain Door Co., Chicago, Ill., have been specified on the 1,000 cars just ordered from the Haskell & Barker Car Co. by the Illinois Central.

Iron and Steel.

According to press dispatches a new steel plant has been built at Ensley City, Ala., for the Tennessee Coal, Iron & Railroad Co. A company, with a capital stock of $1,100,000, is now being formed, of which the Tennessee Coal, Iron & Railroad Co. and New York financiers are to be the stockholders. The bonds for building the mill have been subscribed for. The interest on the bonds is guaranteed by the Tennessee Company.

The rod mill of the Illinois Steel Co. of Joliet, Ill., which has been idle for a month, has resumed operations.

R. W. Hildreth & Co., consulting and inspecting engineers, whose main office is in New York, have opened an office in Philadelphia at 1420 Chestnut street. They have also associated with them as Western representatives and correspondents Ralph Modjeski, M. Am. Soc. C. E.; Byron B. Carter, E. M., with offices in the Monadnock Building, Chicago, and Oscar Lanne, of Milwaukee.

Worth Bros., Coatesville, Pa., have placed an order with the S. R. Smythe Co., Inc., engineers and contractors, of Pittsburgh, to build a 40-ton basic open-hearth steel furnace.

The Clinton Iron & Steel Co., Pittsburgh, Pa., has made a voluntary advance of 10 per cent. in wages.

Phillips & McLaren, proprietors of the Fisher Engine, Foundry & Machine Works, Pittsburgh, Pa., whose plant was destroyed by fire April 6, will erect a new steel building 264x80 ft.

New Stations and Shops.

Plans have been prepared for a new roundhouse of 20 or more stalls to be built by the Pennsylvania Railroad at Huntingdon, Pa.

The Eastern Minnesota has given a contract to Harry Downs & Son, of Minneapolis, Minn., to build a warehouse at West Superior, Wis. It will be 40x199 ft., two stories high and of brick.

The Chicago & Northwestern has secured a permit to build a new freight house at Chicago, Ill. Frost & Granger are the architects.

A permit has been issued to the Pittsburgh & Lake Erie for the building of a train shed at Pittsburgh to cost about $60,000, to be 117x500 ft.

Automatic Signal Patents.

In the United States Circuit Court at Philadelphia May 26 Judge Acheson filed an opinion dismissing the bill in equity brought by the Union Switch & Signal Company against the Philadelphia & Reading Railway Company, in which an injunction was asked restraining an alleged infringement of five patents of the Signal Company on automatic electric signals. This suit was begun in 1894, when the Reading road put in a large number of Hall signals. The Judge made an exhaustive review of all railroad signal patents within the field covered by the plaintiff's bill, and held that there had been no infringement.

Electric Headlights.

The Pyle-National Electric Headlight Company, Chicago, has lately received orders for fitting with electric headlights 10 freight engines now building at the Rogers Locomotive Works for the Texas & Pacific. Also lights for two engines for the New Orleans & Northeastern and four for the Southern Railway. One locomotive for the Florence & Cripple Creek now building at the Baldwin Locomotive Works, and one locomotive for the Gulf & Ship Island Railway now building at Schenectady, will each have two electric headlights, front and back, the current for which will be furnished by a single generator.

Piles and Pile Driving.

The April issue of the Journal of the Association of Engineeering Societies contains a long paper by Mr. Horace J. Howe, member of the Boston Society of Civil Engineers, entitled "Some Instances of Piles and Pile Driving New and Old." A discussion of the paper by various engineers is appended, the whole making a monograph of 56 pages. Mr. Howe's method of treating his subject is the admirable one of carefully collecting experiments and opinions of those who are expert in the matter and refraining, with great self restraint, from theory. The key to his plan is given in a quotation from Sir Christopher Wren, with which he begins his article: "For the improvement of theories we need to be least solicitous. It is a work which will insensibly grow on us. Every one is more prone to exercise his fancy in building paper theories than patient first to pile the unsure foundation and hew solid materials out of the history of nature. I could wish we would have the patience for some years of registering past times."

Alternating Current Machinery for Grain Elevators.

The Westinghouse Electric and Manufacturing Co. is placing in the Fitchburg, Mass., grain elevators alternating current machinery to furnish power to work the carriers. This consists of one 125 K. W. two-phase generator, seven 20 H. P. and two 30 H. P. Westinghouse Type C motors. The induction motor is especially adapted for work in dusty locations, such as above, where the use of direct current motors would be out of the question.

Air Brake Litigation.

Judge Lacombe in the United States Circuit Court May 27 issued an order in the case of the Westinghouse Air Brake Company vs. The Great Northern Railroad Company. The order modified that of April 1, 1898, so as to give the Great Northern Railroad Company 50 additional days from July 10, 1898 (or until August 30, 1898), within which to remove the first 500 New York brakes.

Moving a Bridge Pier.

An important piece of engineering work was successfully carried out Sunday, May 29, when the east pier of the Northern Pacific bridge, at Bismarck, N. D., over the Missouri River, was moved nearly 4 ft. to a new foundation. The work of rebuilding the foundation and preparing for the movement was done during the winter under the direction of Mr. E. H. McHenry, Chief Engineer, without serious interruption to traffic. This bridge, outside of the approaches, consists of three through spans, the center span being 405 ft. and each of the end spans 403 ft. 6 in. long. It was designed and built by Mr. George S. Morison in 1881 and 1883. The masonry pier which has now been placed on a new foundation is 64 ft. 6 in. high, 45 ft. long at the base, and 18 ft. wide, and formerly rested on a foundation of concrete and timbers 50 ft. long, 24 ft. wide and 18 ft. deep.

Battleships for Russia.

Last week we noted that the Wm. Cramp & Sons Ship & Engine Building Co. had secured a contract from the Russian Government to build one battleship and one cruiser. According to an announcement which has been made since then, the contract is much larger and the company will also begin work on 10 torpedo boats. It is reported that the contract for the guns for these boats has been awarded to the Bethlehem Iron Co.

Chicago Street Improvements.

Thirty miles of new street pavements have been contracted for by the Board of Local Improvements of Chicago, and within another month arrangements will be made for about twenty miles more. This is in addition to ordinary street repairs, for which $100,000 will be spent. A vitrified brick pavement will be laid in Dearborn street, between Jackson and Polk streets, in the business district, and several miles of asphalt paving will be laid on the North Side.

The Dams of the Nile.

The British Commander in Chief in the Soudan, Sir Herbert Kitchener, has expressed the hope that the work of building the great irrigation dams at Assouan and Assiout will not be allowed to impede military operations in the Soudan. Mr. John Aird, of the contracting firm of Lucas & Aird, has given assurance that nothing will be done to affect the free passage of troops up the Nile. Altogether 5,000 tons of material, including rails and railroad plant, locomotives, steam cranes, pumps, timber and various contractor's machinery and tools, have been shipped from England. The following is from Lord Cromer's report on the condition of Egypt, recently published as a Parliamentary paper, and gives the estimated costs of the new reservoirs:

Assouan dam and lock	$7,000,000
Assiout dam and lock	2,125,000
Ibrahimiek canal, regulator and lock	425,000
Land and subsidiary works	245,000
Custom duty on material and plant	205,000
Total	$10,000,000

Chicago Intercepting Sewer.

The Twelfth street branch of the new intercepting sewer system of Chicago was completed May 25 and the sewage is now carried into the river instead of into the lake. The effect of the improvement will be that much purer water will be obtained from the Fourteenth street crib. The Twelfth street sewer is now completed between Michigan avenue and the river, and the Twenty-first street sewer between Indiana avenue and the river is almost finished. These two conduits drain the South Side north of Thirty-ninth street by gravity, no pumps being necessary. The section of the conduit on Fourteenth street between State street and the river which is now opened was constructed under forty-seven railroad tracks without interfering with the operation of trains, and without injuring a man.

Car-Heating Suits.

Judge Lacombe, of the United States Circuit Court, Southern District of New York, on May 26, granted to the Consolidated Car-Heating Company a preliminary injunction against the Gold Car-Heating Company and Gold Street Car Heating Company, restraining the latter companies from manufacturing or selling their new style electric heater. The injunction is suspended until Nov. 1, but in the meantime the defendants are under bond, and the suspension does not prejudice any future action which the Consolidated Car-Heating Company wishes to take to enjoin purchasers of the infringing apparatus. The decisions obtained last summer in the United States Circuit Court and Circuit Court of Appeals, in which the Consolidated Car-Heating Company's patents were broadly sustained, were used as a basis for the motion for an injunction.

THE SCRAP HEAP.

Notes.

The car house of the Consolidated (Street) Railway Co., at Irvington, near Baltimore, Md., was destroyed by fire on May 29, together with 130 cars.

A sheriff and two helpers, hunting for the robbers who stopped the Santa Fe train at Belen, N. M., on May 24, were shot and killed two days later by the robbers, who had been surrounded in their camp by the sheriffs.

It appears that the vote in the Locomotive Engineers' convention at St. Louis on the question of federation was more decidedly against the proposition than was at first reported. The vote in favor of federation was only 203, while that against it was 290.

Penalties for Illegal Passes in North Carolina.

The Supreme Court of North Carolina has affirmed the decision of the Lower Court, holding the Southern Railway and the Raleigh & Augusta guilty on the charge of illegally granting passes contrary to the state law. The penalty imposed by the Lower Court was $1,000 against each company. In closing the opinion the court says: "In the face of the clearly expressed provisions of the law, and in the face of the repeated construction of that part of the Federal statutes regulating Interstate Commerce, which is in precisely the same words in which our statute is framed, upon the point now before us, the defendant took its chances.

"It has in doing so violated the criminal law of the state, and must abide the consequences, as all others ought to do who break the laws. It must be presumed that common carriers know well what they are doing in this matter. They are not, and neither do they wish, to be considered charitable institutions. They are corporations, formed for profit and gain, and whenever they grant a thing of value, free transportation to a passenger, not embraced in the excepted classes specified in the act, they must be acting as they think, on business principles, expecting a return upon their investment. If in pursuing their business interests they violate the law, they must abide the result. There is no error, and the judgment is confirmed."

Settlement of Central Transportation Litigation.

The Supreme Court of the United States has reversed the decision of the lower court in the suit of the Pullman Palace Car Co. against the Central Transportation Co. The latter company, operating sleeping cars over the Pennsylvania, was leased to the Pullman in 1870, and the present litigation concerning the valuation of property turned over to the lessee has been pending 13 years. The Pullman Company holds a large majority of the stock of the Central, so that the decision will not have important consequence either way. The Circuit Court for the Eastern District of Pennsylvania gave judgment for $4,235,044. This judgment is now reversed, and the court below was instructed to enter a judgment for $727,846, with interest from 1885, when the lease was canceled, instead of the amount as originally granted. The opinion was rendered by Justice Peckham, who said: "Although the Central Company may have been injured by the result of the lease, yet that is a misfortune which has overtaken it by reason of the rule of law which declares void a lease of such a nature, and while the company may not have incurred any moral guilt, it has, nevertheless, violated the law by making an illegal contract, and one which was against public policy, and it must take such consequences as result therefrom." The judgment is for the value of the Central Company's property in 1885, and $17,000 in cash advanced by the Central Company. Justices Harlan and White dissented.

The Genesee River Co.

The Genesee River Co. was recently incorporated at Albany to control the waters of the Genesee River "for the purpose of improving the sanitary condition of the Genesee Valley, of checking floods, of supplying the necessary water to the enlarged Erie Canal, and of furnishing pure and wholesome water for municipal purposes." The company will build a main reservoir at Portageville, Wyoming County, about 75 miles from the mouth of the Genesee, and is authorized to build all necessary power dams, irrigation canals and raceways on the river, and on its tributaries within a mile from the mouth of each for the development of hydraulic and electrical power, and for the purpose of making and transmitting compressed air. Work on the dam at Portageville must commence within five years. The authorized capital is $3,000,000, with the privilege of increasing to $12,000,000. The incorporators are William A. Boland, Casius M. Wicker, Theodore W. Myers, George W. Rafter and George F. Keller, and the main office will be in Rochester.

Standard Color for Vanderbilt Passenger Cars.

All of the passenger-train cars of the New York Central, the Lake Shore & Michigan Southern, the Michigan Central and the New York, Chicago & St. Louis are to be painted a light olive color with gold striping. The car department officers of the roads named decided upon this color at a recent joint meeting. It is the color of the cars in the Lake Shore Limited train.

Creeping of Rails.

Some German investigators, from observations of the Kaiser Ferdinand Northern Railroad and elsewhere, have decided that the left-hand rail creeps more than the right-hand one. It had also been observed that the left-hand driving wheel wears faster than that on the right of the engine. No explanation of these phenomena is offered in the brief abstract which has come to us of the learned German's paper.

Miniature Locomotives.

Making and exhibiting toy railroad trains appears to be a growing business. The Jersey City (N. J.) Journal says that John Cagney, of that city, is to exhibit a toy train, run by steam, at the Omaha Fair; and that he has formed a stock company which will make 50 such trains, to be exhibited at seaside resorts. The train for Omaha, which was exhibited at Jersey City, consists of a locomotive and three passenger cars. The gage of the track is 9½ in., and the engine weighs 500 lbs. The top of the smokestack is 25 in. above the rail. The engineman, by careful packing, succeeds in loading himself on the tender. Each passenger car will carry one adult or two children.

Lake Steamer.

The new steamer Georgia of the Goodrich Transportation Co., Chicago, will make her first trip on June 4, and after that date will go into regular service between Chicago and towns on the west shore of Lake Michigan. The new boat is especially designed for passenger traffic, and will stop at Racine, Milwaukee, Sheboygan, Manitowoc, Two Rivers, Kewaunee, Sturgeon Bay, Green Bay, Menominee, Escanaba and Manistique.

Electric Traction on Italian Railroads.

In the first week of April a special commission met in Rome to consider the matter of the use of electricity as a motive power on railrads. The Adriatic system presented a complete project, drawn up with the co-operation of Ganz, of Buda Pesth, for an electric installation on a large scale. This project would cover about 60 miles of existing railroad in the Alps and about 50 miles on the line between Bologna and San Felix. The first project is for the use of overhead wires, the power to be furnished from water power and a polyphase current of high tension to be used. A maximum speed of about 36 miles an hour is contemplated. For the second of the two projects it is proposed to use motor cars with storage batteries.

The Mediterranean system presented projects for two experiments, one with overhead conductors and the other with storage batteries. The first of these would be on the line from Rome to Frascati in co-operation with the Roman Tramways Co. The other, the storage battery experiment, would be made between Milan and Monza with motor cars. The distance is about 8 miles, and it is proposed to run a car or train every half hour, to make the journey in 20 minutes

What Does Fourth of July Cost?

A Consular report from Shanghai informus us that in 1897 China exported 26,705,733 lbs. of fire crackers. These were valued at $1,584,151 gold. By far the largest part of these were sent by sailing ships to New York. A small quantity went to England, and other countries bought only infinitesimal amounts.

The Alien Owner.

The sixty-third annual report of the Georgia Railroad & Banking Co. contains little that is of interest to others than the actual owners of the property except a full list of the stockholders. Looking this over, one is struck by the great number of stockholders in the South. There are 1,108 individual holdings; of these 776, or 70 per cent., are in the state of Georgia. In other Southern states—Alabama, Mississippi, Tennessee, South Carolina and others—most of the rest of this stock is held, judging merely by the residence of the stockholders. In fact, we find but 98 out of these 1,100 whose residence is outside of a little group of Southern states, and these are obviously mostly small holdings, among clergymen, the widows of army officers, etc. We doubt if any other considerable railroad property in the United States is owned so locally, unless it may be the Boston & Albany.

Extension of the Bolivar Railroad in Colombia.

The Government of Colombia has entered into a contract with Francisco J. Cismeros for the extension of the Bolivar Railway from Barranquilla, or from any point on the line between Barranquilla and Puerto Colombia to Sabanalarga, or Usiacura. The gage will be 3 ft. 3 1-3 in., and the minimum grade of rails 35 lbs. per yard.

A "Code of Ethics."

The following are the published rules governing students in Sibley College, Cornell University, as formulated under the statutes of the University, which provide that the Director shall control the "whole working" of Sibley College:

(1.) Every student in Sibley College is expected to show himself a gentleman at all times, within or without the precincts of the College.*

(2.) Every gentleman attending Sibley College is expected to be a student.

*Gentleman.—A man of good breeding, courtesy, and kindness; hence a man distinguished for fine sense of honor, strict regard for his obligations and consideration for the rights and feelings of others.—Century Dictionary.

The Chignecto Ship Railroad Scheme.

It is extremely doubtful whether the attitude assumed by the bondholders and shareholders of the Chignecto Marine Transport Railway Company is really calculated to elicit from the Canadian Government a favorable response to the demands made upon it by the company. The Canadian Government has been asked either to re-enact the original Acts of Parliament reinstating the company in possession of its charter and subsidy, and so grant it "sufficient time to complete the railway," or to compensate the company for the sum it has expended upon the partial construction of the line, amounting to about £750,000, and it was suggested at the meeting that the compensation, if that alternative were decided upon, should take the form of an issue of 2½ per cent. bonds for £750,000. It is for the Canadian Government to consider these propositions and decide upon them. But is it at all likely that the Dominion Government, or any other self-respecting body of public men, would be favorably influenced in arriving at a settlement of the questions at issue by charges of repudiating their obligations when it suits their convenience, of instituting dangerous precedents, and of unfair treatment to investors and by thinly-veiled threats of boycotting any fresh Canadian securities offered on this side? Here is no dispute as to the legal rights of the Canadian Government or of the failure of the company to fulfill its obligations under the concession, and the moral aspect of the business will scarcely be emphasized by the suggestion that any other Government would have readily granted the further extension of time which has not been thus far accorded to the Chignecto Company. The subsidy of $150,000 per annum for twenty-five years was granted to the concessionaires in consideration of their contracting to complete the railway by July, 1889; but by that time very little of the work had been done, and although more than one extension has since been granted, the line is still incomplete. It is to be hoped that Sir Wilfrid Laurier and his colleagues may see their way to give the company some reasonable compensation, if the railway is not to be completed, though, as we have said, the claims have been put forward in anything but a conciliatory manner.—"The Economist."

Some Interesting Exhibits at the Electrical Exposition.

We have already noted in past issues some of the exhibits at the Exposition at Madison Square Garden, the time of closing of which has been extended until Saturday of this week. In the line of horseless carriages the Columbia probably attracted the most attention. It is now a year since the Pope Manufacturing Co. put on the market the type of carriage which since then has been used in a number of cities. This carriage has many features which commend itself to the engineer, besides being very attractive. The simplicity and novelty of the steering gear and the ease of regulating the current from the storage batteries which drive the motors have done much to make it as popular as it is. The capacity of the storage batteries is designed to enable the carriage to run about 55 miles on a level road.

In the line of oil and gas engines the Hornsby-Akroyd engine received its share of attention. As is generally known, this engine has some features quite independent of any other oil engine, and it has so far been perfected that a break down is regarded as improbable as in a standard steam engine. The Diesel motor attracted possibly more attention than any other exhibit in the operating department. The remarkable performance of this motor from a theoretical standpoint and its fulfillment of the expectations of Mr. Diesel in its practical operation have caused no little stir among gas engine makers. Whether the complications in the machinery or the high temperature attained by the explosive mixture in driving the engine will be a hindrance to its gen-

eral adoption can hardly now be determined. At any rate, its present performance promises much for engines of large powers. The motor shown is the only one which has been put up in the United States and is of 20 H. P., being coupled directly by rigid coupling to the armature shaft of a C. & C. generator. It runs at about 170 revolutions and the fuel used is ordinary kerosene oil.

Oiling the Roadbed.

We have recently published a description of the car arrangement of the Long Island Railroad Company for covering the surface of the ballast with oil. We are now informed that a section from Valley Stream through Far Rockaway to Hammels, about 12 miles, has just been oiled, and that this work will continue for 15 or 20 days longer.

Summer School of the Mass. Inst. of Technology.

The Summer School in Civil Engineering will be held at Lancaster, Mass., this year. This course in geodesy, topography and hydraulics is open to third-year men in the Civil Engineering Department. It is expected that 24 men, including 6 instructors, will attend. The work will cover, among other things, the gaging of the Nashua River below the dam, the use of the meter on the mill flumes at Clinton, the rating of the meters on Spectacle Pond and the production of a topographical map of the vicinity of Lancaster, based on the state triangulation.

Chicago Street Railroad Franchises.

The committee of Chicago citizens which was appointed to investigate the question of extension franchises for the street railways, as mentioned in our issue of last week, held a meeting at the Grand Pacific Hotel May 24, and adjourned sine die, after deciding not to proceed with the investigation. This action was decided upon on account of the refusal of Mayor Harrison to co-operate with the committee or to appoint representatives to represent the city officially, the Mayor taking the ground that he had no authority to make such appointments.

British Railroad Accidents in 1897.

The British Board of Trade has issued its report of the accidents and casualties on the railroads of the United Kingdom for the year ending Dec. 31, 1897. In train accidents (including all locomotive boiler explosions, whether on trains or otherwise, and including permanent-way accidents, whether connected with a train accident or not, and accidents at highway grade crossings where trains have run through gates, etc.) the number of persons killed was 34 and of injured 476. Eighteen passengers, nine employees and seven other persons were killed, and 324 passengers, 140 employees and 12 other persons were injured. In the preceding year the total number of killed was only eight; five passengers and three employees. The reports of accidents to trains, etc., include all failures of machinery, tires, axles and rails; washouts, fires, etc. The average mileage of 36 iron crank or driving axles which failed was 266,496 miles, and of 59 made of steel it was 249,960 miles.

A second summary in the report gives the totals of accidents to persons other than train accidents, etc. This table shows (including the totals just given from the first table) 133 passengers, 510 employees and 522 other persons killed, and 1,639 passengers, 4,129 employees and 334 other persons injured. The aggregate of these items, 1,165 killed and 6,102 injured, is somewhat larger than the totals for 1896, which were 1,008 killed and 5,877 injured. The "other persons" include 387 trespassers, of which 132 are classed as suicides; and 48 of the killed were persons on business at stations.

In addition to the casualties tabulated, there are mentioned in a note 90 killed and 11,274 injured "in accidents in which the movement of cars or engines was not concerned." These accidents include falling on steps leading to or from stations, falling over packages on platforms, falling off platforms, injuries of men at work in freight houses and engine houses, employees injured in track work, etc. Some of these classes of casualties are probably included in reports made by railroads in some American States. If we add these to the tabulated statistics of the English report we find, in the language of the report, that the "total number of personal accidents reported to the Board of Trade by the railway companies during the year amounts to 1,255 persons killed and 17,376 injured."

LOCOMOTIVE BUILDING.

The Baldwin Locomotive Works are building one engine for the Vicksburg, Shreveport & Pacific (Queen & Crescent route).

The Richmond Locomotive & Machine Works have received an order for 17 compound locomotives from the Finland State railroads.

The Cooke Locomotive & Machine Co. is building two 10-wheel engines for the St. Louis, Peoria & Northern, to weigh 120,000 lbs., with 92,000 lbs. on the drivers. They will have 19 x 24 in. cylinders, 56 in. driving wheels, radial stayed boiler, with a working steam pressure of 180 lbs.; firebox, 108 in. long and 33¾ in. wide; tender capacity, 4,000 gals. water and 7 tons of coal, and be equipped with Westinghouse brakes, Ross-Meehan brake shoes, Janney couplers, Ohio injectors, United States metallic piston and valve rod packings, Crosby safety valves, Leach sanding device, Detroit lubricators, Pickering springs and Latrobe tires.

CAR BUILDING.

The Colorado Midland is having one passenger car built.

The St. Charles Car Co. is building 20 cars for G. O. Braniff & Co.

The St. Charles Car Co. is building one car for the Coahuila & Zacatecas.

The Middletown Car Works are building six cars for the Geiser Mfg. Co.

The Missouri Car & Foundry Co. is building 100 cars for the Omaha Packing Co.

The Missouri Pacific is having 2,500 cars built by the Missouri Car & Foundry Co.

The Atlantic Coast Line is building 100 box and 50 flat cars at its Wilmington shops.

The Michigan Peninsular Car Co. is building 500 freight cars for the Grand Trunk.

The St. Charles Car Co. is building 123 freight cars for the Mississippi River & Bonne Terre.

Jackson & Woodin are building 25 cars for the Lackawanna Live Stock Transportation Co.

The Barney & Smith Car Co. is building two passenger cars for the Chicago & Northwestern.

The Colorado & Northwestern is having three passenger cars built by the Barney & Smith Car Co.

It is stated that the Minneapolis & St. Louis will order 200 box cars, but we have no official information.

The Chicago & West Michigan is having one passenger car built at the works of Pullman's Palace Car Co.

The Cincinnati, New Orleans & Texas Pacific is having two passenger cars built by the Barney & Smith Car Co.

The Illinois Central has placed an order with the Haskell & Barker Car Co. for 900 box and 100 refrigerator cars.

We are officially informed that the Choctaw, Oklahoma & Gulf intends to buy soon 50 box, 200 coal and three caboose cars.

The Chicago, Rock Island & Pacific has ordered 500 new box cars of 60,000 lbs. capacity from the Michigan-Peninsular Car Co.

We are officially informed that the Western New York & Pennsylvania is not considering buying any new equipment at present.

The recent order of the Delaware & Hudson Canal Co. was for 150 flat cars with Jackson & Woodin and 50 box cars with the Union Car Co.

The Pittsburgh & Western is having three passenger cars built by the Barney & Smith Car Co., and 400 gondola cars by the Schoen Pressed Steel Co.

We are officially informed that the Flint & Pere Marquette has prepared specifications and plans for new box cars, and will probably ask for bids soon, but the number to be ordered has not been definitely decided upon.

The Chihuahua & Pacific has placed an order with the Ensign Mfg. Co. for 50 box and 30 flat cars. A synopsis of the specifications for this equipment was given in our issue of May 13. The specifications for the new passenger cars have not yet been sent out.

The Grand Trunk has ordered 250 box and 250 stock cars from the Michigan Peninsular Car Co., and will build 250 refrigerator cars at its Montreal shops. As mentioned in our issue of March 25, 300 coal cars are also being built at the Montreal shops, making 1,050 new cars in all.

The St. Louis Car Co. has received an order to build 20 open cars for the Nassau Electric Railroad of Brooklyn, N. Y.

BRIDGE BUILDING.

ALLENTOWN, PA.—Proposals will be received at the Mayor's office until six (6) o'clock p. m. on June 7 for the erection of an iron or steel bridge over the Lehigh River at a point on South Second street leading to Kline's Island. Plans and specifications can be had upon application from the City Engineer. Fred E. Lewis, Mayor.

AUSTIN, TEX.—The Red River Causeway & Bridge Co., of Hardeman County, was recently incorporated at Austin, with a capital stock of $500. Incorporators: H. B. Newberry and J. W. Odell, of Quanah, Tex., and B. S. Livingston, of Eldorado, O. T.

CHICAGO, ILL.—Chicago papers state that the Engineering Committee of the Drainage Board has agreed to recommend acceptance of the following lowest bids on contracts: The Carnegie Co., bridge over the channel at Lemont for the Atchison, Topeka & Santa Fe, $76,185; McArthur Bros. & Winston Co., substructure for same bridge, $7,254; Penn Bridge Co., bridge over the Desplaines River for the same road at Lemont, $26,890; King Bridge Co., highway bridge over the channel at Kedzie avenue, $21,315.

COLUMBUS, O.—It is stated that bids are asked until June 14 for building a truss bridge, 259 ft. long, over Big Walnut Creek. W. H. Halliday, County Auditor. (Feb. 25, p. 146.)

EDMONTON, N. W. T.—Bids will be asked for the superstructure of the new bridge at this place, the substructure of which is now being built by the Provincial Government.

ELKTON, MD.—Recent floods in Cecil County swept away four iron and three wooden bridges, the total damage to the county being estimated at $25,000 for bridges. Two of the bridges belonged to the Lancaster, Cecil & Southern (B. & O.). Information can probably be had from John Bank, Treasurer, or Powell F. Johns, Surveyor of Cecil County.

ENOSBURG FALLS, VT.—Press reports state that the Board of Selectmen will build new bridges over Giddings Brook at St. Albins street and Orchard street.

HASTINGS, MINN.—Dakota County will build a new steel bridge over Cannon River, in Sciota.

KANSAS CITY, MO.—The Board of Public Works is holding hearings on the question of a viaduct proposed over the railroad tracks between Twenty-third and Allen streets and Nineteenth and Wyoming streets. The viaduct, if built, will span the tracks of the Santa Fe, Chicago, Burlington & Quincy and the Fort Scott & Memphis railroads. It is stated that the companies interested have agreed on dividing the cost of the structure as follows: The Stock Yards Company, $10,000; the Santa Fe, $6,000; the Fort Scott & Memphis, $6,000, and the Chicago, Burlington & Quincy, $2,500, the city to furnish the balance of $8,500 and maintain the viaduct at an estimated cost of $1,200 a year. The board would agree to the maintenance, but not to the $8,500 asked. Henry A. Wise, City Engineer.

LEBANON, O.—The Commissioners of Warren County will build a steel bridge, 90 ft. long and 16 ft. wide.

MERCER, PA.—Press reports state that bids are wanted June 16 for building four iron bridges. George E. Hamilton, County Clerk; D. S. Breakman, County Surveyor.

OAKLAND, MD.—The special committees appointed by the County Commissioners of Carroll and Baltimore counties reported in favor of building a bridge across the northwest branch of the Patapsco River at Oakland. The bridge is to be of steel, span 80 ft., and not to exceed in cost $1,600, each county to pay one-half the sum and to build its own approach. M. F. Connor, Towson, Clerk, Baltimore County; Alfred T. Buckingham, Westminster, Treasurer, Carroll County.

PITTSBURGH, PA.—The Thompson Run Bridge Co. was recently incorporated, with a capital of $5,000. Directors: S. G. Woods, F. M. Ross, J. H. Milholland, G. T. Marsh, Pittsburgh; W. S. Mitchell, Allegheny.

ST. LOUIS, MO.—A bill has been introduced in the Council to make an additional appropriation for rebuilding Franklin bridge, in Forest Park. Albert H. Zeller, Engineer, Board of Public Improvements.

STOCKTON, CAL.—The Supervisors of San Joaquin County will shortly build a new steel bridge.

TOWSON, MD.—The Commissioners of Baltimore County received a petition asking for a bridge over the stream at Oregon Post Office.

TUCKAHOE, N. J.—The Boards of Freeholders of Cape May and Atlantic counties held a joint meeting recently, and decided to build a $10,000 bridge at Tuckahoe, each county paying half.

YOUNGSTOWN, O.—Bids are asked until June 22 for building the substructure for the bridge at South avenue over the Mahoning River. William M. Godfrey, Auditor, Mahoning County.

ZANESVILLE, O.—It is stated that bids are wanted June 16 for the superstructure of a steel bridge over the Licking River at State street. James L. Starkey, Auditor, Muskingum County.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Boston & Albany.—Quarterly 2 per cent., payable June 30.

Delaware & Hudson Canal.—Quarterly, 1¾ per cent., payable June 15.

Rio Grande Western.—Preferred, 1¾ per cent., payable Aug. 1.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Society of Civil Engineers.—Meets at the house of the society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month at 8 p. m.

American Society of Railroad Superintendents.—Annual meeting, Crossman House, Alexandria Bay (Thousand Islands), N. Y., July 13 and 14.

Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.

Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7.30 p. m.

Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.

Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

Chicago Electrical Association.—Meets at Room 7,137, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, secretary.

Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.

Denver Society of Civil Engineers.—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth street, on the third Thursday of each month, excepting July and August, at 7.30 p. m.

Engineers' Club of Columbus (O.).—Meets at 12½ North High street on the first and third Saturdays from September to June.

Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

Engineers' Club of Philadelphia.—Meets at the house of the club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month at 8 p. m., except during July and August.

Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburg, Pa., on the third Tuesday in each month at 7.30 p. m.

Locomotive Foreman's Club.—Meets every second Tuesday in the clubroom of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

Master Car Builders' Association.—Saratoga Springs, N. Y., Wednesday, June 15.

Master Mechanics' Association.—Saratoga Springs, N. Y., Monday, June 20.

Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7.30 p. m.

New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

New York Railroad Club.—Meets at 12 West Thirty-first street, New York City, on the third Thursday in each month at 8 p. m.

Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

Northwestern Track and Bridge Association.—Meets at the St. Paul Union Station on the Friday fol-

lowing the second Wednesday of March, June, September and December, at 2.30 p. m.

Railway Club Secretaries.—Congress Hall, Saratoga, N. Y., June 8, 11 o'clock a. m. H. H. Roberts (St. Louis Railway Club), Secretary.

St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m.

Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.

Technical Society of the Pacific Coast.—Meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month at 8 p. m.

Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is secretary.

Western Railway Club.—Meets in Chicago on the Third Tuesday of each month at 2 p. m.

Western Society of Engineers.—Meets in its rooms on the first Wednesday of each month at 8 p. m., to hear reports and for the reading and discussion of papers. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago.

Boston Local Freight Agents' Association.

A branch of the National Association of the Local Freight Agents' Associations has been formed at Boston. The President is A. H. Porter and the Secretary is G. P. Robinson.

Accounting Officers.

The Association of American Railway Accounting Officers held its annual meeting at Atlantic City, N. J., May 25 and 26. The officers elected for the ensuing year are: P. A. Hewitt (C., C., C. & St. L.), President, and C. G. Phillips (C. & N. W., Chicago), Secretary. The next meeting will be held at Montreal June 21, 1899.

Western Railway Club.

At a meeting of the Board of Directors of the Western Railway Club held in Chicago on May 27, Mr. F. M. Whyte was unanimously re-elected Secretary of the club for the ensuing year. Mr. Whyte will represent the club at the meeting of railroad club secretaries to be held at Saratoga in June during the M. C. B. and M. M. conventions.

Illinois Street Railway Association.

At the first annual meeting of this association, to be held in Chicago June 7, the following papers will be presented: "The Right of Street Railways Under the Constitution," C. L. Bonney; "The Operation of Street Railways in Small Cities," F. X. Lesseure; "Systems of Collecting Fares and Checking Employees," W. L. Ferguson; "Relations of Street Railways and Municipal Corporations," D. B. Sherwood.

American Institute of Electrical Engineers.

The annual meeting of the Institute was held in New York on May 17. The report of the Counsel showed a membership of 1,098 members. The committee appointed to count the ballots reported the election of the following officers: President, Arthur E. Kennelly; Vice-Presidents, Prof. Robert B. Owens, William Stanley, Jr., Dr. Cary T. Hutchinson; Secretary, R. W. Pope; Treasurer, George A. Hamilton; Managers, Herbert Lloyd, Dr. Samuel Sheldon, Prof. George F. Sever and Charles P. Steinmetz.

Western Society of Engineers.

The April issue of the Journal of the Western Society of Engineers contains some important papers and discussions. The topics are: "The Evolution of the American Type of Water Wheel," by W. W. Tyler; "Mechanical Plants of Large Buildings," by Dankmar Adler; "Improved Portland Cement," by John W. Dickinson; "Fireproof Construction and Prevention of Corrosion," by Gen. William Sooy Smith; "Fireproofing of Warehouses," by Frank B. Abbott. With all of these there is more or less important discussion.

Southern & Southwestern Railway Club.

The club held a regular meeting at the Kimball House, Atlanta, May 14, President Thomas in the chair. The subjects discussed were the "M. C. B. Rules" and "Loading Lumber." Messrs. S. A. Charpiot, R. J. Tobey, J. E. Capps and W. L. Tracy, as a committee, prepared a report of recommendations to be sent to the arbitration committee of the M. C. B. Association.

The next meeting will take place Thursday, August 14. Mr. J. R. Gordon was appointed by the President to prepare a report for this meeting on "Trains Parting."

Northwestern Electrical Association.

Arrangements have been perfected for the summer convention of the association to be held on the steamer Northwest during a trip to Duluth and Superior, leaving Chicago on June 10 after the adjournment of the National Electric Light Association Convention. The plans for this trip were outlined in "The Railroad Gazette" of April 1, page 244. It is expected that the attendance will be large, and a number of papers will be presented and discussed on the trip. Stateroom assignments will be made at once, and it is hoped that where ladies are to accompany members prompt notice will be given to J. M. Hill, Chairman Committee of Arrangements, 1240 Monadnock Bldg., Chicago, in order that suitable accommodations may be secured.

National Electric Light Association.

The programme for the entertainment of this association at the Chicago meeting June 7, 8 and 9, includes an informal reception at the Auditorium Hotel Monday evening, June 6, when music will be furnished and light refreshments served. Tuesday evening there will be a lake trip by steamer, with music and refreshments, and on Wednesday evening a lecture by Joseph Wetzler on "Electricity from Coal." During the business meetings of the association on Tuesday and Wednesday the ladies will be entertained by tally-ho parties, on Tuesday through the South Park systems, and on Wednesday through Lincoln Park, Sheridan Drive, and possibly as far north as Evanston. In order to assist visiting members the local committee will arrange for hotel accommodations for those who wish to secure rooms in advance. Mr. C. H. Wilmerding is chairman of this committee.

The English Railroad Museum.

The first annual meeting of the National Railway Museum Association, London, was held May 18, Mr. C. Rous-Marten presiding. The business was mainly of a formal nature, consisting chiefly in the election of officers for the ensuing year, as follows: Chairman of Executive Committee, Mr. C. Rous-Marten; Hon. Treasurer, Mr. Dombrain; Hon. Secretaries, London, Mr. F. W. Brewer; Edinburgh, Mr. Norman D. MacDonald. Other business was postponed to an adjourned meeting fixed for June 8. The Chairman drew attention to the fact that several leading papers had published in some detail a fictitious report of a purely imaginary "annual" meeting said to have taken place in October last when the Association had been in existence only seven months. No meeting of any kind was held by the Association on the date named.

The address of Mr. Brewer is 90 Cloudesley Road, N., London.

Engineers' Club of Philadelphia.

At the regular meeting of the club, held May 21, President L. Y. Schermerhorn in the chair, Col. E. D. Meier read a paper on the Diesed motor, upon which discussion followed. The paper by Mr. Joseph Appleton, on "Recent Developments in the Application of Storage Batteries," which was to have been the paper of the evening, will be read at the next meeting, June 4. Mr. Charles Piez exhibited and described views of a moving stairway and an air conveyor.

In support of a statement made in the discussion on survey methods at the last meeting, Prof. L. F. Rondinella gave some figures to show that with good instruments and careful work a very great degree of accuracy could be obtained in surveys made with the stadia.

A business meeting will be held June 4 at 8 p. m. This will be the last stated meeting previous to the Summer recess.

The Civil Engineers' Club of Cleveland.

On May 24, 1898, Mr. Joseph R. Oldham, N. A., presented a paper on the subject of "The Mechanical Theory of Naval Architecture." He gave an account of the International Congress of Naval Architects held in London last July, and reviewed some of the papers presented, and particularly that of Sir E. J. Reed on "The Advance in the Mathematical Theory of Naval Architecture" during the existence of the institution. He discussed quite fully the theory of the stability of ships, and described the latest application of water ballast to secure stability by raising the center of gravity. He showed that some vessels having considerable stability in the normal position nevertheless may capsize easily, while others which roll easily, neverless have a large moment of stability under increasing angles of inclination.

Passing from the subject of the paper proper, he gave an addendum on the state of our navy and its possible future developments. Most of our naval vessels have been designed for the protection of our shores, having therefore rather small coaling capacity, which permits of a very heavy armament. If we are to take part in the affairs of the world in all quarters of the globe we shall require, like Great Britain, larger ships with high freeboard and large coaling radius.

American Society of Civil Engineers.

The thirtieth annual convention of the American Society of Civil Engineers will be held at Detroit, Mich., July 26 to 29. The following committees of Arrangements have been appointed:

Committee of the Board of Direction: George Y. Wisner, J. J. McVean, Charles Warren Hunt.

Local Committee: George Y. Wisner, Chairman; A B. Atwater, J. D. Hawks, C. E. Greene, H. S. Hodge, D. A. Molitor, J. C. Hutchins, G. S. Williams.

The following papers will be presented: "Experiments on the Flow of Water in the Six-Foot Steel and Wood Pipe Line of the Pioneer Electric Power Company at Ogden, Utah," by Charles D. Marx, M. Am. Soc. C. E.; Charles B. Wing, Assoc. M. Am. Soc. C. E., and Leander M. Hoskine, C. E. "The Determination of the Safe Working Stress for Railway Bridges of Wrought Iron and Steel," by E Herbert Stone, M. Am. Soc. C. E. "Marine Wood-Borers," by Charles H. Snow, M. Am. Soc. C. E. "Reservoir System of the Great Lakes of the St. Lawrence Basin: Its Relation to the Problem of Improving the Navigation of These Bodies of Water and Their Connecting Channels," by Capt. Hiram M. Chittenden, Corps of Engineers, U. S. A.; with a Mathematical Analysis of the Influence of Reservoirs upon Steam Flow, by James A. Seddon, Esq. "Dredges and Dredging on the Mississippi River," by J. A. Ockerson, M. Am. Soc. C. E. "Three-Hinged Masonry Arches; Long Spans Especially Considered," by David A. Molitor, M. Am. Soc. C. E.

The Board of Directors has proposed certain amendments to the constitution designed to better systematize the accounting department and to put definite supervision of the accounts and financial affairs into the hands of the Finance Committee, which is doubtless an excellent step in that it makes responsibility more direct and narrows it down, always a good thing to do.

On June 1 at the regular meeting of the society, Mr. Robert B. Stanton delivered an address on the "Cliff Dwellers of the Far Southwest; Their Homes There and Agricultural and Engineering Works and Their Military Knowledge and Art." This was illustrated by lantern slides. On the 15th the paper will be by Mr. N. B. Sweitzer on "The Origin of the Gulf Stream and Circulation of the Waters in the Gulf of Mexico," with special reference to the effect on jetty construction.

The discussion on Mr. James Ritchie's paper on "The Lorain Dry Dock and Shipyard" closed Jan. 1. Discussion on Mr. Ogden's paper on "Flushing in Pipe Sewers" will be closed June 15 and discussion on Mr. Buck's paper on "The Niagara Arch" will be closed July 1.

The first three of the papers mentioned as to be presented at the Convention appear in the May proceedings and they are papers of quite unusual importance.

PERSONAL.

—Mr. M. E. Cooley, Professor of Mechanical Engineering in the University of Michigan, M. Am. Soc. M. E., is Chief Engineer of the United States auxiliary cruiser "Yosemite."

—Mr. Beecher B. Ray, Secretary of the Railroad and Warehouse Commission of Illinois, with office at Springfield, has resigned his position to accept the place of Paymaster in the Army with the rank of Major.

—Mr. James M. Fitzgerald, Vice-President of the Staten Island Railway (B. & O.), died at his home in New York city May 26, at about 60 years of age. At the time of his death he was engaged in the paper business, and was also a member of the Chamber of Commerce.

—Mr. John Williams, Superintendent of the machine department of the Newport News Ship Building & Dry Dock Co., died at Newport News, Va., May 23. Previous to joining the Newport News Company, Mr. Williams occupied a responsible position with the Neafia & Levy Ship Building Co. of Philadelphia.

—Prof. Henry Wilson Spangler, M. A. S. M. E., of the Chair of Dynamic Engineering of the University of Pennsylvania, has been assigned by the Navy Department as Naval Engineer on the monitor Montauk. Prof. Spangler is a graduate of the U. S. Naval Academy, and has served several years in the navy.

—Mr. I. M. Fleming, who recently resigned as Division Freight and Passenger Agent of the Florida, Central & Peninsular, with office at Savannah, has accepted service with the Armour Car Lines & Fruit Growers' Express, having been appointed General Southeastern Agent, with headquarters at Savannah, Ga., succeeding Mr. P. H. Loud, Jr., resigned. (May 20, p. 366.)

—Mr. Edwin A. Miller has been appointed by President Clausen, of the Park Board, New York City, to be Chief Engineer of Parks of Manhattan and of The Bronx Boroughs, succeeding the late Montgomery A. Kellogg. (April 22, p. 229.) Mr. Kellogg's title was Engineer of Construction, but his successor's will be Chief Engineer. Mr. Miller was assistant to Mr. Kellogg for 20 years.

—Dr. Arthur E. Kennelly, who was recently elected President of the American Institute of Electrical Engineers, was born in Bombay, India, in 1861. He was for many years active in submarine cable work, and in 1887 received the premium of the Institute of Electrical Engineers of England for a paper on Localizing Cable Faults, as well as the Intion Fahie premium in 1888. For several years, up to 1888, he was in the service of the Eastern Telegraph Company. He resigned in that year to become Electrician to the Edison laboratory. In 1895 he received the honorary degree of Doctor of Science from the University of Pennsylvania for original work in electrical research.

—Mr. William Perry Walker, Jr., Freight Traffic Manager of the Chesapeake & Ohio, and also representative of that road on the Board of Managers of the Joint Traffic Association, died at his home in Clifton Forge, Va., May 25, after an illness of several months. Mr. Walker was born in Newport, Ky., Sept. 3, 1850, and entered railroad service in 1878 with the Chesapeake & Ohio, with which road he has been almost continuously. In 1886 he was Manager of the Kanawha Dispatch, and four years later became Freight Traffic Manager of the Chesapeake & Ohio. When the Joint Traffic Association was formed Mr. Walker was selected to represent the Chesapeake & Ohio and the Cleveland, Cincinnati, Chicago & St. Louis in that body. He was also for several years General Freight Agent of the Cincinnati, Portsmouth, Big Sandy & Pomeroy Packet Co.

—Among the latest new Brigadier Generals of Volunteers we find a number of engineers. One of these is Francis Vinton Greene, M. Am. Soc. C. E., Colonel of the 71st New York. Gen. Greene is the son of Gen. George S. Greene, the oldest living graduate of West Point. The son also graduated from West Point, and, with high distinction, was commissioned in the artillery, transferred to the Corps of Engineers, won fame as military attaché with the Russian army in the last Russo-Turkish war, resigned and became President of the Barber Asphalt Paving Company. Others of the new Brigadier Generals are Col. Peter C. Hains, Corps of Engineers, U. S. A., M. Am. Soc. C. E.; Col. George L. Gillespie, Corps of Engineers, U. S. A., and Col. O. H. Ernst, Corps of Engineers, M. Am. Soc. C. E., Superintendent United States Military Academy.

—Mr. Daniel S. Newhall, Assistant Secretary of the Pennsylvania and Superintendent of the Employees' Savings Fund of the Pennsylvania, was on May 25 made Purchasing Agent, succeeding Samuel Porcher, Assistant Purchasing Agent, who has been acting as Purchasing Agent since the death of Mr. A. W. Sumner. (Feb. 4, p. 87.) Mr. Newhall was born in Germantown, Pa., in April, 1849. He was elected Secretary of the Pennsylvania in February, 1882, and has filled the following positions until this date: Superintendent of the Employees' Saving Fund from the date of its organization in 1887; Secretary of the Manor Real Estate & Trust Co.; Assistant Secretary of the Philadelphia, Wilmington & Baltimore of the Junction Railroad, and of the Philadelphia & Baltimore Central. He was also Superintendent of the General Office Division of the Relief Department of the Pennsylvania.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—A. P. Maginnis has been appointed Tax Commissioner of the Santa Fe, Pacific & Southern California, in addition to his duties as Claim Agent. His headquarters remain at Los Angeles, Cal.

Amos Goodhue has been appointed General Foreman of the Mechanical Department of the Santa Fe Pacific at Emporia, Kan., succeeding T. F. Underwood transferred (Apr. 29, p. 317). John W. Record has been appointed General Foreman at Needles, Cal.

Cape May & Delaware Bay Navigation Co.—At the annual meeting of this company held at Cape May, N. J., May 30, the following Directors were elected for the ensuing year: William F. Russell, President; Charles H. Mason, S. John Lea, Clinton Warne, William J. Down, Samuel N. Beek and Norman Grey.

Central Ontario.—H. S. Johnson of Cleveland, O., and George Collins of Trenton, Ont., were elected new Directors at the annual meeting held in Trenton, Ont., May 18. Mr. Johnson was elected Vice-President and Mr. Collins was re-elected General Superintendent and Secretary.

Fort Scott Central (Missouri Pacific).—At the annual meeting held May 21 in Fort Scott, Kan., the following Directors were elected: George J. Gould, S. H. H. Clark, C. G. Warner, A. H. Webb, J. H. Richards, C. E. Benton and C. A. Lakin. The offi-

cers chosen are the same as those of the Kansas & Colorado Pacific.

Fort Worth & Rio Grande.—John S. Jones, heretofore Acting Auditor, has been appointed Auditor with office at Fort Worth, Tex. Mr. Jones is also Secretary.

Jacksonville, Tampa & Key West.—W. D. Barnett has resigned as Cashier and Paymaster to accept the position of Cashier in the National Bank of Jacksonville, Fla. E. P. Bacon has been appointed Cashier and Paymaster in addition to his duties as Chief Clerk to the Receiver, to take effect June 1.

Kanawha Dispatch.—The following changes and appointments took effect May 15: F. S. Devine, heretofore Agent at Milwaukee, has been transferred to Chicago; A. C. Pauley, heretofore Eastbound Agent at Chicago, has been made Contracting Agent at Chicago; C. R. Lewis, formerly Traveling Freight Agent of the C., C., C. & St. L., with headquarters at Chicago, has been made Agent of the Kanawha Dispatch and General Agent of the C., C., C. & St. L. at Chicago; C. C. Devine, heretofore Traveling Agent of the K. D., with headquarters at Kansas City, is transferred to Memphis.

Kansas & Colorado Pacific (Missouri Pacific).—At the annual meeting held May 21 in Fort Scott, Kan., the following Directors were elected: George J. Gould, New York; S. H. H. Clark, C. G. Warner, St. Louis; A. H. Webb, Wichita; J. H. Richards, C. E. Benton, George O. Bacon, Fort Scott. The officers elected are: President, George J. Gould; Vice-President, S. H. H. Clark; Secretary and Treasurer, A H. Calef; Assistant Secretary, J. H. Richards, and Assistant Treasurer, D. S. Smith.

Lackawanna Line.—Charles H. Hunt, formerly Westbound Agent in Detroit, Mich., has been appointed Westbound Agent in St. Louis, Mo., succeeding J. T. Patten.

Lake Shore & Michigan Southern.—President W. H. Newman announces that on and after May 26 the Elkhart & Western R. R., recently purchased, extending between Elkhart and Mishawaka, Ind., 12 miles, will be operated by the L. S. & M. S. as the Elkhart Branch of the Michigan Division, and the powers and duties of its general officers are extended over said railroad. (May 27, p. 384.)

D. F. Lillis, who has served as Secretary to the President of the Lake Shore for ten years, will continue in this capacity under President Newman. He acted as Secretary for Presidents Newell, Caldwell and Callaway.

Lehigh Valley.—Hon. Wilson S. Bissell, formerly Postmaster-General, was elected a Director May 18. President Alfred Walter and Second Vice-President John B. Garrett removed their offices to the Havemeyer Building, Cortlandt street, New York, last Thursday. General Traffic Manager H. H. Kingston, General Freight Agent A. L. Foster and C. S. Lee, General Passenger Agent, moved from Philadelphia to New York on May 2. (May 6, p. 332.) The whole of the Traffic Department is now located in New York.

John T. Keith has been appointed Division Superintendent of the Mahanoy & Hazleton Division, succeeding George W. Brill, who has been Acting Superintendent since the resignation of A. P. Blakeslee. (Mar. 24, p. 224.)

Missouri, Kansas & Texas.—William O'Herin, Superintendent of Machinery and Equipment, informs us there is no truth in the report that he will remove his office from Parsons, Kan., to Sedalia, Mo., as reported by contemporaries, the subject having never been discussed by the management.

Mobile & Ohio.—General Freight Agent Joseph T. Poe has appointed D. W. Buhl Division Freight Agent of the Montgomery Division, Artesia, Miss., and Montgomery, Ala., inclusive, with headquarters at Montgomery, Ala. He will have supervision over the Soliciting Freight Agencies at Atlanta, Ga., and Jacksonville, Fla. Frank J. Burke is appointed Traveling Freight Agent, with headquarters at Atlanta, Ga., to the territory north of the line of the Georgia & Alabama, east of the South and North and Nashville & Decatur Divisions of the Louisville & Nashville, and south of the states of Kentucky and Virginia, reporting direct to D. W. Buhl, Division Freight Agent, Montgomery, Ala. Louis C. Cardinal is appointed Traveling Freight Agent at Jacksonville, Fla., under the charge of D. W. Buhl, Division Freight Agent at Montgomery. C. W. Gibson, heretofore General Agent at West Point, Miss., has been made Traveling Agent to solicit freight between East Cairo and Meridian, Miss., inclusive, including Aberdeen and Starkville Branches; also, to solicit freight traffic from connecting lines west of the M. & O. and south of the Ohio River.

Northern New Hampshire (B. & M.).—At the annual meeting held in Concord, N. H., May 26, the following were elected Directors: Alvah W. Sulloway, Franklin; Joseph H. Benton, Jr.; Silas Pierce, Uriel H. Crocker, Benjamin P. Cheney of Boston, Dexter Richards of Newport and William N. Thayer of Concord.

Pacific Mail Steamship Company.—At the annual meeting held in New York, May 25, the following Directors were elected: Collis P. Huntington, Henry Hart, Isaac E. Gates, Calvin S. Brice, Samuel Thomas, George H. Macy, Russell Sage, George J. Gould and R. P. Schwerin.

Pennsylvania.—D. S. Newhall has been appointed Purchasing Agent. (See Personal column.) Lewis Neilson has been appointed Assistant Secretary, succeeding Mr. Newhall, promoted. Appointments effective June 1.

Peterborough (B. & M.).—The following Directors were elected at the annual meeting held in Nashua, N. H.: Virgil C. Gilman, George A. Ramsdell, Henry A. Cutter, George F. Andrews of Nashua, Thomas B. Eaton of Worcester, George H. Ball, C. E. A. Bartlett of Boston. Hon. G. A. Ramsdell was elected President.

Pittsburgh, Youngstown & Ashtabula.—At the annual meeting of the stockholders in Youngstown, O., May 19, J. Twing Brooks was elected a Director, succeeding the late John E. Davidson.

St. Paul Union Depot.—At the annual election held in St. Paul, May 11, W. A. Scott was elected President in place of A. B. Plough, retired.

Silverton.—F. P. Thornton has resigned as Auditor, with office at Denver, Col. The general offices have been removed from Denver to Silverton, Colo.

West Shore.—C. W. Bradley, General Superintendent of the W. S., Wallkill Valley and the New Jersey Junction, has resigned, his resignation taking effect June 1. He is succeeded by G. E. Hustis. Mr. Bradley has been General Superintendent of the above-named roads for the past 13 years.

RAILROAD CONSTRUCTION

Incorporations, Surveys, Etc.

ALASKA ROADS.—The line from Skaguay to Lake Bennett via the White Pass, for which contracts have been let (May 27, p. 382), is to be known as the White Pass Ry. It is to be built by the Pacific Contract Co. of Seattle, Wash., of which E. C. Hawkins, formerly of Denver, is Manager. The Illinois Steel Co. of Chicago has the contract for the rails; G. M. Forbes of Trinidad, Col., will supply the timber for ties, bridges, round-houses, stations, etc. The rolling stock is to be supplied by the Pullman Car Co., including 35 cars and three engines for the construction train. The road under contract is 40 miles long, and it is proposed to extend it to Fort Selkirk, north 400 miles from Skaguay.

CAMMAL & BLACK FOREST.—This company contemplates building three miles of new tracks this year and grading will be begun during June. The line extends from Cammal, Pa., to the Tioga County line, 21.4 miles. (Official.)

CHICAGO GREAT WESTERN.—Work is in progress in reballasting 214 miles on the Southwest Division between Marshalltown, Ia., and St. Joseph, Mo. The track is being raised 5 inches.

CHICAGO, MILWAUKEE & ST. PAUL.—New terminals and warehouses have been completed by the C., M. & St. P. for the Canada Atlantic Line at Milwaukee, Wis. The C. A. operates steamers during the navigation season between the end of the C. A. Ry. at Parry Sound (Can.) and Duluth, Milwaukee and Chicago.

CHICAGO TERMINAL TRANSFER. — McArthur Bros. of Chicago have the contract for building the extension from Franklin Park, just west of the city limits of Chicago, east 6.75 miles to Mayfair, within the limits, where connection is to be made with the Chicago, Minneapolis & St. Paul and the Chicago & North Western. (April 8, p. 265.)

CHIHUAHUA & PACIFIC.—Tracks are laid on 3 km. (1.9 miles), and 21 km. (13 miles) are graded from Chihuahua, Mexico. The Nassau Construction Co. of New York City has the contract for building 200 km. (124 miles) from Chihuahua, west to Guerrero, and 400 km. additional is projected. Edward S. Safford of Chihuahua, Mex., is Chief Engineer. (May 20, p. 367.)

DAYTON, LEBANON & CINCINNATI.—H. E. Talbott, Chief Engineer, informs us that 10 miles of 60-lb. steel has just been placed on the main line, it being the only improvement since the first of the year.

DELAWARE VALLEY, HUDSON & LEHIGH.—Hart & McTighe of Brooklyn, N. Y., have been awarded the contract for building this line from Stroudsburg, Pa., northeast 45 miles up the Delaware Valley, through Bushkill and Milford to Matamoras, and building is to begin within 60 days. Dr. J. V. Lung, 382 Marion street, Brooklyn, N. Y., is President. (Feb. 25, p. 148.)

DULUTH & NORTHERN MINNESOTA.—Work is begun on this Minnesota line of Alger Smith & Co. of Detroit, Mich., which is to run from Duluth northeast through St. Louis and lake counties into extensive lumber tracts owned by that company. Martin S. Smith, of Detroit, Mich., is president. (May 20, p. 367.)

ESCANABA RIVER.—Grading is begun, according to report, on this line from Escanaba, Mich., northwest about 60 miles to Republic, a point on the Chicago & Northwestern; 100 men are at work. Isaac Stephenson of Marinette, Wis., is president. (May 20, p. 367.)

GULF, TEXAS & NORTHERN.—This company has been incorporated in Texas to build a line from Orange, north about 200 miles to Marshall. The incorporators are D. C. Plumb, C. W. Higgins, John B. Mesery and James C. Meeks of Chicago.

HIGHLAND & ST. JOSEPH.—This company has been incorporated in Kansas with a capital stock of $25,000, to build a line from a point on the St. Joseph & Grand Island near Severance, north 7½ miles through Doniphan County to Highland: The directors are: J. E. Marcell, A. J. Thomas, W. M. Boone, Norman Case, Z. L. Gilmore, G. W. Overlander, James L. Allen and J. H. Bingham, all of Highland.

JONESBORO, LAKE CITY & EASTERN.—This company has filed a certificate in the office of the Secretary of State at Little Rock, Ark., to increase its capital stock from $60,000 to $225,000, the purpose being to extend its line east toward Luxoria on the Mississippi River. The road now runs from Nettleton, Ark., east 12.2 miles to Lake City. A. J. Kerfoot, Jonesboro, Ark., is General Manager. (April 1, p. 245.)

KANSAS & SOUTHEASTERN.—Eighteen miles of track has been laid from Hunnewell to Blackwell, Kan., on this line, from Hunnewell southeast via Braman, Okla., to Tonkawa, Okla., 11 miles. F. S. Eaton of Braman, Okla., has the contract. The New York representative is Dwight Braman, 7 Nassau street. (Apr. 8, p. 266.)

KANSAS & TEXAS COAL.—This company, whose incorporation in Missouri was noted last week (p. 383), is to build and operate about 10 miles of railroad in Macon and Randolph Counties, connecting Ardmore, which is on a short branch from the Wabash R. R., with Bevier in Macon County on the Burlington Lines in Missouri. The line is being built by the Kansas & Texas Coal Co., which owns and operates among the largest coal properties in the southwest in the States of Arkansas, Kansas, Missouri and the Indian Territory. The company at present has mines both at Ardmore and Bevier, and owns a considerable part of the land over which this line will be built. The object of the line is the development of the coal field which is now mined only at its northern end of Bevier and its southeastern extremity at Ardmore. This is the largest body of minable coal in the State of Missouri and from which there has been the largest production of coal in the State for a number of years, and its production is constantly increasing.

The contract for the line has been let and also purchases made of rails and track supplies. The rails are 60-lb., continuous joints. No additional equipment will be necessary over that which the company already owns in the operation of the three mile branch from Excello, Mo., to Ardmore. It is expected that this road will be in operation by Oct. 1. The officers of the company are B. F. Hobart, President, and Geo. B. Leighton, Vice-President; principal offices, St. Louis, Mo. (Official.)

LONG ISLAND.—Rapid progress is being made on the extension of the North Shore terminus northeast 4.25 miles to Port Washington, L. I. The abutments of the bridge on Grace avenue, Manhasset, are completed and the approaches filled in. The bridge is in position and is receiving the finishing touches. Grading on the road is nearly completed, and it is expected that the line will be open for travel in July. (Dec. 24, 1897, p. 919.)

MICHOACAN & PACIFIC.—Grading is finished on 30 km. (18.6 miles) of this line from Yurecuoro, Mex., on the Mexican Central, southeast to Ario, 300 km. (186 miles). Contracts are let for 60 km. to Zamora, and surveys are made as far as Ario. L. R. Gordon of Zitazro is General Superintendent. (Dec. 17, 1897, p. 898.)

MIDLAND OF NOVA SCOTIA.—Grading was begun May 19 on this line from Windsor, N. S., east 60 miles to Truro. W. O. Strachan of Montreal is President. (May 13, p. 348.)

MINNEAPOLIS, ANOKA & RAINY LAKE.—The people of Itasea County, Minn., on May 24, voted $50,000 aid in building this proposed line from Minneapolis north about 200 miles through Anoka, Cambridge and Mora, to Grand Rapids, a point on the Duluth, Superior & Western. Senator Washburn, of Minneapolis, is among those interested. (Dec. 17, 1897, p. 898.)

MISSOURI PACIFIC.—The St. Louis, Iron Mountain & Southern has let contracts for the raising of its tracks 2 ft., on 13 miles, between Memphis, Tenn., and Gavin, Ark. The M. P. has placed orders since Jan. 1 for 16,000 tons of 75-lb. rail, which is to be used for betterments during the present year.

MOSCOW, CAMDEN & SAN AUGUSTINE.—This company has been incorporated in Texas with a capital stock of $250,000 to build a railroad from Moscow, a point on the Houston, East & West Texas, northeast about 50 miles through Tyler and Angelina counties to San Augustine. Among the incorporators are: C. H. Jones, Galveston; J. E. McAshan, Houston, and E. A. Carter, Camden.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—Track is laid, according to report, to within 12 miles of Decatur, Ala., on the Middle Tennessee & Alabama extension from Madison Crossroads south through Cluttsville. About 150 men are at work. The company expects to reach Decatur in the early fall. (Mar. 25, p. 225.)

PENNSYLVANIA COMPANY.—Twenty-four miles on the Wheeling Branch of the Pittsburgh, Cincinnati, Chicago & St. Louis is being ballasted and 5 miles of rails is shortly to be laid.

RICHLAND & MAHONING.—This company was incorporated in Ohio, May 25, with a capital stock of $150,000, to build a line from Mansfield east about 100 miles through the counties of Richland, Ashland, Wayne, Stark, Portage, Trumbull and Mahoning to the Pennsylvania State line. The incorporators are: Charles W. French, V. A. Dehnel, S. T. Cummings and C. Hedges.

RIO GRANDE & PAGOSA SPRINGS.—Rails are laid for six miles from Chromo to Price, Col., on this line, from Edith north 30 miles to Pagosa Springs. E. M. Biggs of Edith, Col., is President. (Official.)

SANTA FE, PRESCOTT & PHOENIX.—Twelve miles of grading is completed on the extension of this line from Prescott, Ariz., east 26 miles into the Big Bug mining district. (Mar. 4, p. 170.)

SEABOARD AIR LINE.—A. C. Wright & Co., 807 East Clay St., Richmond, Va., have the contract for building the 11-mile extension from Lawrenceville, Ga., southeast to Logansville. (March 18, p. 208.)

WHITE RIVER, LONOKE & WESTERN.—Eight miles of track is laid between Panola and Lonoke, Ark., on this line, from Wooley, a point on the St. Louis, Iron Mountain & Southern, northwest through Lonoke to Seaton. A. P. Weaver of Jacksonville, Ark., is President. (Mar. 11, p. 189.)

WASHINGTON COUNTY.—E. J. Colley & Co. of Nebraska have taken a contract to build 23 miles between Cherryfield and Whitneyville, Me., on this line, along the Atlantic coast in Washington County, Me., from Ellsworth on the Maine Central, east about 104 miles to Calais. The laying of rails was begun on May 2 for a portion of this road. G. M. Rusling of Machias, Me., is Chief Engineer.

Electric Railroad Construction.

ASBURY PARK, N. J.—The Asbury Park & Sea Girt Railroad Co. was recently incorporated with a capital of $100,000, of which $25,000 is paid in. It is stated that the company will acquire the property of the Asbury Park & Belmar Street Railway Co. and make some extensions. The incorporators are: John E. Comins, Daniel H. Shea and H. B. Perine. The office of the company will be at 701 Mattison avenue, Asbury Park.

BALTIMORE, MD.—The Walbrook, Gwynn Oak & Powhatan Ry. Co., one of the lines of the Baltimore Traction Co., will build an extension in the western suburbs.

BOWLING GREEN, O.—Press reports state that the Bowling Green Railway Co. was incorporated with a capital of $40,000. The incorporators are: T. H. Whayne, C. H. Shield and J. C. Mahon.

BUFFALO, N. Y.—The Buffalo & Lockport Ry. Co. has made a 5 per cent. 40-year mortgage with the Colonial Trust Co. of New York for $1,000,000 to cover cost of construction. (May 6, 20; pp. 333, 367.)

CLEVELAND, O.—George D. Claflin, Jr., and Peter

Kearny are interested in a project to build a short electric road on Lake St. to Gordon and Wade Parks.

COPLAY, PA.—The Coplay, Egypt & Ironton street Railway Co. was recently incorporated to build an electric railroad about five miles long. The capital is $50,000. The directors are H. Y. Horn, President, Coplay; Jilson J. Coleman, Maurice L. Kauffman, Allentown, Pa.; J. G. Heyle, Coplay; W. B. Clark, Catasaqua, Pa. This district is now served by the Ironton (steam) Railroad.

DETROIT, MICH.—The Detroit, Ypsilanti & Ann Arbor Electric Ry. will open its through line from Detroit to Ann Arbor, 38 miles, for passenger and freight business June 1.

EPHRATA, PA.—The Ephrata Electric Railway Co. is reported incorporated with a capital of $15,000. The directors are: F. E. Bailey, Philadelphia; S. N. Bailey, Dillsburgh, Pa.; A. W. Mentzer, J. W. Von Neida, Ephrata.

HOBOKEN, N. J.—The Jersey City Street and Water Board adopted an ordinance allowing the North Hudson Ry. Co. to operate the Jersey City branch of its Jersey City and Hoboken line by electricity, and to erect the necessary trolley system in Grove street.

MALONE, N. Y.—Mr. F. P. Stetson, President of the Board of Trustees of Malone, informs us that the Malone Electric St. Ry. Co. will probably be granted a franchise to build from Malone to Lake Titus and Duane, 9 miles. J. P. Kellas, Malone, is attorney for the company.

QUEBEC, QUE.—We are informed that the Quebec, Montmorency & Charlevoix Railway contemplates changing its motive power from steam to electricity. This company operates 30 miles of road from Hedleyville, a suburb of Quebec, northeast along the north bank of the St. Lawrence to Cape Tourmente.

ROCHESTER, N. Y.—An electric railroad is talked of to run from Rochester to Sodus Bay, 30 miles. The promoters are Joseph C. Tone, Ira M. Ludington and Charles Van Voorhis.

SYCAMORE, ILL.—The Geneva Lake, Sycamore & Southern Electric Ry. Co. was given a 50-year franchise by the town of Geneva Lake, Wis. (Dec. 31, '97, p. 937.)

GENERAL RAILROAD NEWS.

Railroad Earnings.

Showing the gross and net earnings for the periods ending at the date named:

April 30:		1898.	1897.	Inc. or Dec.	
Atchison, Topeka & Santa Fe.					
1 month	Gross	$3,212,989	$2,784,381	I.	$428,608
1 "	Net	798,434	479,574	I.	318,860
10 months	Gross	32,924,130	28,111,994	I.	4,812,136
10 "	Net	9,226,436	7,403,320	I.	1,823,116
Buffalo, Rochester & Pittsburg.					
1 month	Gross	$325,037	$258,865	I.	$66,172
1 "	Net	109,441	87,896	I.	21,545
10 months	Gross	3,062,704	2,792,959	I.	269,745
10 "	Net	1,090,077	940,223	I.	149,854
Canadian Pacific.					
1 month	Gross	$1,958,462	$1,617,859	I.	$340,603
1 "	Net	717,091	627,117	I.	89,974
4 months	Gross	7,205,166	5,731,822	I.	1,473,344
4 "	Net	2,389,620	1,905,496	I.	484,124
Chesapeake & Ohio.					
1 month	Gross	$912,933	$903,032	I.	$9,901
1 "	Net	273,309	253,801	I.	19,508
10 months	Gross	9,831,228	8,992,069	I.	839,159
10 "	Net	3,197,303	2,905,817	I.	291,486
Chicago, Burlington & Quincy.					
1 month	Gross	$3,255,366	$2,675,824	I.	$579,542
1 "	Net	116,667	20,754	I.	95,913
10 months	Gross	36,055,615	29,697,991	I.	6,357,624
10 "	Net	5,673,136	3,770,228	I.	1,902,908
Chicago, Milwaukee & St. Paul.					
1 month	Gross	$2,585,545	$2,203,769	I.	$381,776
1 "	Net	759,010	740,447	I.	18,563
10 months	Gross	28,688,156	25,408,568	I.	3,279,588
10 "	Net	11,018,726	10,025,819	I.	992,907
Cleveland, Cincinnati, Chicago & St. Louis.					
1 month	Gross	$1,164,765	$1,068,978	I.	$95,787
1 "	Net	281,434	243,406	I.	38,028
10 months	Gross	11,937,577	10,932,200	I.	1,005,377
10 "	Net	2,815,864	2,769,605	I.	46,259
Erie.					
1 month	Gross	$2,604,544	$2,418,567	I.	$185,977
1 "	Net	553,615	536,342	I.	17,273
10 months	Gross	28,180,329	25,873,355	I.	2,306,974
10 "	Net	7,048,557	6,607,873	I.	440,684
Lehigh Valley.					
1 month	Gross	$1,366,271	$1,376,467	D.	$10,196
1 "	Net	264,582	240,407	I.	24,175
5 months	Gross	7,076,827	6,877,478	I.	199,349
5 "	Net	1,729,278	1,294,695	I.	434,583
Lehigh Valley Coal Company.					
1 month	Gross	$801,109	$748,135	I.	$52,974
1 "	Net	87,953	83,552	I.	4,401
5 months	Gross	5,784,882	5,697,497	I.	87,385
5 "	Net	264,946	251,801	I.	13,145
Long Island.					
1 month	Gross	$283,909	$280,574	I.	$3,335
1 "	Net	45,697	46,462	D.	765
10 months	Gross	3,487,274	3,179,973	I.	307,301
10 "	Net	1,008,956	920,452	I.	88,504
Long Island System.					
1 month	Gross	$297,989	$295,677	I.	$2,312
1 "	Net	40,859	41,335	D.	476
10 months	Gross	3,778,251	3,480,723	I.	297,528
10 "	Net	1,102,746	984,112	I.	118,634
Oregon Railroad & Navigation Co.					
1 month	Gross	$580,852	$315,400	I.	$265,452
1 "	Net	211,111	93,071	I.	118,040
10 months	Gross	5,267,260	3,631,044	I.	1,636,216
10 "	Net	2,342,039	1,534,376	I.	807,663
Pennsylvania.					
1 month	Gross	$5,358,172	$5,011,972	I.	$346,200
1 "	Net	1,524,208	1,511,308	I.	12,900
4 months	Gross	20,715,209	19,318,609	I.	1,396,600
4 "	Net	5,672,128	5,550,828	I.	121,300
Pennsylvania Company.					
1 month	Gross	.....	.....	I.	$474,600
1 "	Net	.....	.....	I.	57,000
4 months	Gross	.....	.....	I.	1,837,800
4 "	Net	.....	.....	I.	549,200
Pittsburg & Western.					
1 month	Gross	$268,016	$206,692	I.	$61,324
1 "	Net	90,164	56,222	I.	33,942
10 months	Gross	2,300,804	1,961,195	I.	339,609
10 "	Net	678,843	628,982	I.	49,861
Reading Company:					
Philadelphia & Reading.					
1 month	Gross	$1,634,618	$1,554,313	I.	$80,305
1 "	Net	623,156	635,954	D.	12,798
10 months	Gross	18,469,024	17,324,362	I.	1,144,662
10 "	Net	8,190,449	7,679,183	I.	511,266
Coal and Iron Company.					
1 month	Gross	$1,545,000	$1,088,392	I.	$456,608
1 "	Net	*98,268	*129,117	D.	*30,849
10 months	Gross	19,511,599	17,910,181	I.	2,601,418
10 "	Net	616,664	227,499	I.	389,165
*Loss.					
St. Louis & San Francisco.					
1 month	Gross	$533,819	$478,201	I.	$55,618
1 "	Net	198,547	168,640	I.	29,907
10 months	Gross	5,802,484	5,013,470	I.	789,014
10 "	Net	2,462,937	2,178,345	I.	274,592
Southern (exclusive of Memphis division).					
1 month	Gross	$1,613,010	$1,489,813	I.	$123,197
1 "	Net	441,877	389,825	I.	52,052
10 months	Gross	17,305,187	16,172,047	I.	1,133,140
10 "	Net	5,660,134	5,227,374	I.	432,760
Wabash.					
1 month	Gross	$1,110,041	$878,253	I.	$231,788
1 "	Net	278,537	261,046	I.	17,491
10 months	Gross	10,975,620	9,646,665	I.	1,328,955
10 "	Net	3,348,418	2,957,521	I.	390,897

BALTIMORE & OHIO.—The receiver's report of earnings and disbursements for the month of April, show total receipts of $4,572,669, and disbursements of $2,798,412, leaving net earnings of $1,774,257.

BALTIMORE & OHIO & CHICAGO (B. & O.).—Charles H. Coster of New York, and James Pond of Baltimore, holders of bonds of this company, filed application in the United States Circuit Court at Chicago, May 31, for foreclosure of the property. The road runs from Chicago Junction, O., to Brookdale, Ill., 262.6 miles, with two branches, aggregating 2.3 miles. It was built and owned by the B. & O. Interest on the bonds is in default since December.

CENTRAL VERMONT.—Judge Wheeler, of the United States Circuit Court, has overruled the demurrer of the C. V. to the first and second foreclosure bills and ordered the defendants to answer the bills by the July rule day.

CINCINNATI & MUSKINGUM VALLEY.—Judge Taft in the Federal Court, Cincinnati, O., has entered a decree of foreclosure against this road, and appointed General B. R. Cowen Special Master. The upset price is $500,000, and each bidder must deposit a guaranteed check for $5,000. The sale is to take place at Zanesville, O. (May 6, p. 333.)

DETROIT, TOLEDO & MILWAUKEE.—This company has cancelled its lease of the Chicago & West Michigan tracks from Holland, Mich., to Grand Haven. The change took effect June 1. The lease was made in September, last year. (Sept. 17, 1897, p. 659.)

GREAT NORTHERN.—The Seattle & Montana Railroad Co. has been incorporated in Washington, with a capital stock of $12,500,000, to take over the property of the S. & M. Railway and the Fairhaven & Southern, together with the unfinished new Westminster & Southern and the Portland & Puget Sound roads. A circular recently issued by the G. N. Company to the stockholders is as follows:

The Seattle & Montana R. R. Co. owns, either directly or through ownership of the entire capital stock of local companies, a continuous completed line of railway extending from Seattle, Wash., northward along and near to the eastern shore of Puget Sound, by way of Ballard, Everett, Fairhaven, New Whatcom and Blaine, in the State of Washington, to the south bank of the Fraser River, opposite to the city of New Westminster, in British Columbia; also a branch line, extending from Fairhaven Junction, easterly to the coal mines in the Skagit River coal region, together with all usual appurtenances, including shops, docks, terminal lands, and equipment. That company also owns one-half the capital stock of the Portland & Puget Sound R. R. Co., which has been organized to construct and operate a railroad from Seattle to Portland. A large amount of work in the construction of this latter line has already been done. The Seattle & Montana R. R. Co. has no funded debt.

To aid in constructing and acquiring the railways and other properties mentioned, this company has made advances, running through a series of years, and amounting, up to March 1 of the present year, with interest, to about $11,300,000. The moneys forming these advances would otherwise have been subject to distribution, in the form of dividends, among this company's stockholders. In consideration of the release of the indebtedness resulting from these advances, the owners of the capital stock of the Seattle & Montana R. R. Co. have, under agreement with this company, transferred the whole thereof, viz., $12,500,000, to the Manhattan Trust Co. of New York, as trustee, in trust for the equal and ratable benefit of all the stockholders of this company, of record at the close of business on the 1st day of July, 1898, in proportion to their several holdings; distribution of said shares to be made on Oct. 1, 1898. Certificates of your right to receive your pro rata share of the capital stock of the Seattle & Montana R. R. Co. will be delivered to you, after the close of this company's stock transfer books on July 1, 1898.

Holders of 4 per cent. collateral trust bonds ($15,000,000 outstanding), are notified that in conformity with the conditions of the deed of trust, all these bonds will be redeemed at par and accrued interest at the office of the company in New York on Sept. 1.

LOUISVILLE & ST. LOUIS.—Receiver Geo. T. Jarvis of the Louisville, Evansville & St. Louis Consolidated, was authorized May 24 by Judge Woods to buy at $85,000 the L. & St. L. which runs from Centralia, O., to Drivers, 16.4 miles, and has been leased since July 1, 1896, to the Jacksonville & St. Louis. The L. & St. L. went into the hands of a receiver some years ago. The L., E. & St. L. Con. has trackage rights over the L. & St. L., which forms part of its main line, and by the new arrangement will own its own roadbed, and at the same time receive rental from the J. & St. L. for a portion of the track of the acquired road.

NEW ORLEANS & WESTERN.—Receiver Van Nostrand has asked for authority to issue $400,000 of receivers' certificates to improve the Port Chalmette property. This line went into the hands of a receiver on Jan. 10 last. (Jan. 14, p. 35.)

NEW YORK CENTRAL & HUDSON RIVER.—J. P. Morgan & Co., New York, announce that their offer to exchange various N. Y. C. & H. R. R. bonds for the new 3½ per cent. gold bonds of 1997 of the same company at 103½ and interest will be withdrawn on June 10, after which date the rate will be 104 and interest. (Feb. 25, p. 150.)

PITTSBURGH & WESTERN. — This company announces that it has decided to extend $219,000 Pittsburgh, Newcastle & Lake Erie 7 per cent. first mortgage bonds maturing June 1, at the rate of 4 per cent. until June 1, 1917. Arrangements are made with Simon Borg & Co., New York, to purchase said bonds at par, and to extend the same in their account, Simon Borg & Co. reserving the right to terminate the privilege thereby extended to bondholders without notice. Referring to this, Simon Borg & Co. announce that they are prepared to purchase at par and accrued interest any of the bonds which holders may desire to sell rather than extend.

UNION PACIFIC.—An auction sale was held at the Real Estate Exchange, New York, May 25, by W. D. Cornish, Special Master, of various collateral securities held by the U. P. of the nominal value of $435,000. (May 20, p. 368.)

Electric Railroad News.

BROOKLYN, N. Y.—The Coney Island & Brooklyn has made a mortgage to the Mercantile Trust Co. on property at Smith and Huntington streets and Coney Island avenue and King's Highway, and upon the franchises of the company, to secure an issue of 4 per cent. bonds made necessary by the consolidation agreement with the Brooklyn City & Newtown R. R. (Mar. 4, p. 172.)

NEWARK, N. J.—The North Jersey Street Railway Co. has made a mortgage to the Manhattan Trust Co., as trustee, for $15,000,000 to secure $15,000,000 of 50-year gold bonds, bearing 4 per cent. interest after May 1, 1899.

WASHINGTON, D. C.—At a meeting of the stockholders of the Washington & Glen Echo Railroad, at Glen Echo, Md., a new Board of Directors was elected, as follows: Gustav Stahl, Wharton E. Lester, Thomas C. Pole, W. Staelin Stahl and Richard Ough. The directors elected Mr. Gustav Stahl, of Philadelphia, President; W. Staelin Stahl, Secretary and Treasurer, and Thomas C. Pole, Vice-President and General Manager.

TRAFFIC.

Traffic Notes.

On May 26 the Interstate Commerce Commission resumed its inquiry into freight rate irregularities at Minneapolis, but again adjourned on account of the inability of the officers to find the necessary witnesses.

The Merchants' Association of New York has secured from the Trunk Line and the Joint Traffic Associations, reduced rates for "merchant excursions" to New York Aug. 7 to 10, and 27 to 31, and Sept. 1 to 4, and 10 to 14.

The Southern Pacific, which lately met the passenger competition of the Canadian Pacific from San Francisco by reducing fares by the Shasta route, has now made a reduction (in the second class fares), by the Sunset route, the rate to Chicago being $32.50, and to New York $42.55, instead of $52.50 and $66.50 respectively.

The railroads southwest of St. Louis have reorganized their passenger association and a meeting will be held to elect a Chairman on June 6. The new Southwestern Freight Bureau is not yet in working condition, the Missouri Pacific having, it is said, made conditions in affixing its signature to the agreement. A meeting will be held this week to fix up matters.

The roads in the Joint Passenger Committee (Joint Traffic Association lines) have agreed to honor Government transportation orders drawn on them calling for tickets from starting point to final destination. Heretofore when the holder of a Government order for transportation presented himself to the initial line on his journey, he has been given transportation over that line only. When he changed to another road he was obliged to secure another ticket. Under the new arrangement the initial line will show in its bill the proportion accruing to each road, and in the case of Government aided roads, the Treasury Department will advise what deductions are to be made from regular rates.

The railroads in the Transcontinental Freight Bureau have agreed upon an advance in freight rates from New York and Chicago to the Pacific Coast, to go into effect June 15, or as soon thereafter as the tariffs can be prepared. It is said that the advances average about 20 per cent., and that on many important commodities the difference between carload and L. C. L. rates is greater than in the old tariff. Following are said to be the changes:

	1.	2.	3.	4.	5.	A.	B.
New	$3.00	$2.60	$2.20	$1.90	$1.60	$1.60	$1.25
Old	2.40	2.15	2.00	1.70	1.65	1.60	1.10

In clauses C, D and E there is no change. These are $1,00, $1.00 and $0.95 respectively.

The Managers of the Joint Traffic Association have approved the resolution of the Joint Passenger Committee that an excess baggage check be adopted for use in checking over two or more roads, the excess receipt and the baggage check to be combined in one piece; that city transfer companies discontinue checking sample baggage from hotels or residences and that such companies in checking any lot of baggage likely to weigh more than the free allowance shall be required to attach a suitable strap check which will serve to notify the baggageman at the station to make out a C. O. D. excess check.

Eastbound shipments from Chicago last week aggregated about the same as the week before, but it is said that although the shipments early in the week were heavy there was in the last few days a marked diminution, indicating a slackening of the European demand for grain and provisions. The New York Journal of Commerce reports a great reduction in the rates for transportation of grain to European ports. On May 1 large steamships were chartered at about 16 cents a bushel; on May 26 the rate was down to about 10 cents a bushel. Some shippers who had made contracts at the higher rate sold them to other parties at a loss of $6,000 or more on a single ship. It is said that the enormous demand of the past few months was due to the fear that ocean commerce would be disturbed by the war and that the demand slacked off immediately after the victory at Manila. Rates on grain from New York by regular steamers have not shown a corresponding decline and their accommodations are well engaged to the middle of June.